FORESTRY ABSTRACTS

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THE CHIEF RESEARCH CENTRES FOR FORESTRY AND WOOD UTILIZATION IN THE NEAR AND FAR EAST

EXCLUDING MALAYA AND CHINA

A FORMER article covering the main research centres in continental Europe, appeared in *Forestry Abstracts* 13 (pp. 119–31). The information given below was collected in much the same way and follows a similar pattern. The Bureau would be grateful for early intimation of any new research centres or developments in this or any other region, so that up-to-date information may from time to time be made available.

THE NEAR EAST

ISRAEL

1. The Forest Research Station, Ilanoth, near Natanya, was established in the years 1948 and 1949. During 1950 and 1951 three laboratories, for silviculture, forest entomology and wood technology were erected, along with the founding of two new arboreta. The Station forms part of the Forest Research Division of the Forest Department under the Ministry of Agriculture. It collaborates closely with the Hebrew University, Jerusalem.
2. There are sections for entomology, silviculture, tree races and seed, increment studies, and timber technology. The Institute and its staff are still being expanded.
4. Research activities comprise: pedological studies in Eucalyptus and *Pinus pinea* forests; seed germination and protection; nursery techniques; experiments with various tree exotics, notably Euro-American Poplar hybrids; resin tapping of *Pinus halepensis*; insect pests (notably *Phoracantha semipunctata* and *Matsucoccus*); and mycorrhizae, particularly on Pine and Oak species. Together with the Hebrew University, the Institute is engaged on an ecological, botanical, and entomological study of the Negev desert region.

TURKEY

1. Forestry research is centered at the Faculty of Forestry of Istanbul University, which has research sections directed by the various professors of the Forestry Faculty. The Faculty became autonomous in 1948 and has recently decided to set up a central forestry research authority (Ormancılık Araştirma Enstitüsü) on which the individual sections will be represented. This authority is being financed by the Forest Service and will keep the sections in touch with the practical problems of Turkish forestry.
2–4. There are now 9 sections ('Enstitü'): forest botany (taxonomy, genetics, formation of an arboretum); soil science and site studies; silviculture (ecological foundations of Turkish forestry, seed testing, nursery practice, afforestation of burnt areas, plantation techniques, provenance questions); entomology and forest protection (including diseases); forest products (properties of Turkish timbers and minor forest products, harvesting methods, utilization); business economics and mensuration; forest policy, management and working plans; engineering (including logging and transport, soil conservation and torrent training, and surveying); and, from 1952, forest geography and Near East forestry (world forestry developments and forest geography with special reference to Turkish problems, liaison with research institutions abroad, forestry problems of the Near East as a whole).

The research staff numbers over 30, each section having 3–5 scientists, including its director.

THE FAR EAST

BURMA

1–3. There is no Institute as such. Research in forestry proper is conducted through the Research and Working Plans Circle of the Forest Service, while forest products and utilization research is carried out through the Utilization Circle (both created in 1920) with headquarters at Rangoon. The former has 3 research sections or branches, viz. silviculture, botany, and entomology, with a total of 5 graduate officers; the experimental plots and arboretum are in the Botanical Gardens at Maymyo.

Within the Utilization Circle, research is conducted by a special Divisional Forest Officer with a staff of 5 (2 assistants, a forest economist, a seasoning expert and a workshop superintendent).

4. A wide programme of research in the Research and Working Plans Circle includes: selection of sample and increment plots of important species, particularly Teak, for yield tables etc.; compilation of volume tables for all commercial species; study of Teak mortality, growth rates and crown space in natural forest; reclamation of areas infested with *Imperata cylindrica*; regeneration of mixed and evergreen forests; effect of fire exclusion and early burning on Bamboo. Current research projects in the Utilization Circle include: methods of cutch boiling; preservation, seasoning and working qualities of Burmese timbers, and their suitability for battery separators.

INDO-CHINA

Centre de Recherches Scientifiques et Techniques du Viet-Nam (Service des Recherches Forestières), Saïgon, Viet-Nam

1. This new (1951) centre replaces the Service des Recherches Forestières et de l'Enseignement Forestier (Forest Research and Teaching Service). Its organization is still in progress and the statutes are not yet settled. The trend, however, is to follow the lines of a private society, subordinate to the three associated Indo-Chinese States of Viet-Nam and to France itself.

2. There are 4 sections within the centre:—documentation; botany and ecology; silviculture, provisionally located at Saigon; and (wood) technology, at Pnom-Penh. The research staff numbers 4.

3. Associated with this centre are the following:

(*a*) Station de Recherches Forestières de Populations Montagnardes du Sud Indochinois (P.M.S.I.), at Dalat;

(*b*) Station Expérimentale Forestière de Manline (research staff of 2) which is attached to (*a*);

(*c*) Station Expérimentale de Langhanh (research staff of 2), also attached to (*a*);

(*d*) Station de Recherches Forestières du Nord-Cambodge, at Kompongcham (1 research scientist);

(*e*) Station Expérimentale Forestière de Trangbom, which is attached to the silviculture branch at Saigon (1 research scientist);

(*f*) Station Expérimentale Forestière de Dran (research staff of 2) at Dalat, which is directly under the Chef du Service des Recherches Forestières.

4. The research programme, which has recently been drawn up, includes the following current activities:—At the main Saigon centre: The reconstruction of the herbarium and botanical collections; study of the open forests of southern Indo-China; collection and interpretation of all literature connected with aerial photography; seed studies and nursery practice; influence (litter) of important Indo-Chinese species on the soil; reforestation trials with quick-growing pioneer and intermediate species; physical and mechanical properties of Indo-Chinese species, and their seasoning and preservation.

At (*b*) above: Study of broadleaved species at high altitudes for fuel production; trials in reforesting degraded soils with hardy and (if possible) quick-growing species.

At (*c*): tapping and natural and artificial regeneration of *Pinus merkusii*.

At (*d*): establishment of pure trial plots of the main southern Indo-Chinese species, in order to study their behaviour, development etc. on basalt soils.

At (*e*): as at (*d*), but on siliceous clay soils.

At (*f*): management of a *Pinus khasya* forest of 18,000 ha. (rotation 32 years) for pulpwood production.

INDONESIA

Balai Penjelidikan Kehutanan, Bogor, Java

1. Research on forestry and forest products is centralized at this Institute (Forest Research Institute) at Bogor (Buitenzorg). Founded in 1913 at the instance of the Forest Officers' Association, as a division of the Forest Service, its work gradually extended and in 1930 it moved into new buildings. In 1949, as part of the post-war reorganization, 2 large buildings for the extension of technological research were erected. The arboretum, nurseries and experimental garden surrounding the Institute now extend to 30 acres.

2–3. Research work, as reorganized in 1949, is carried out by the following 4 sections: forest production (subsections include physiology, tree-breeding, exotics, silviculture and mensuration), forest influences, wood technology, and forest botany. There are also a museum, a library and a publications section. The staff of research scientists at present numbers 12, of whom 6 are engaged on wood technology and 3 on forest production research. There are no subsidiary centres.

4. Since the war, investigations include: the silviculture of pure plantations (continuing pre-war studies), silvicultural and management problems in the natural forest; tree-breeding and vegetative propagation. In forest influences a working group has recently been formed from all services and institutes concerned with hydrological and soil-conservation research. Utilization research is being extended, as soon as the necessary equipment is available, to log peeling, gluing, and the manufacture of fibreboard, pulp and paper.

JAPAN

The Forest Experiment Station, Meguro, Tokyo

1. Both forestry and forest products research of the National Government are directed from this centre at Meguro, near Tokyo. It has grown from the 'Tree Experiment Station' established in 1878 at Tokyo itself and moved in 1899 to Meguro, where, after successive reorganizations and expansions, it emerged in 1949 as the present Forest Experiment Station (Norinsho Ringyo Shikenjo) of the Forestry Agency (Rinyacho) of the Ministry of Agriculture and Forestry.
2. The centre has eight sections: general affairs; management; reforestation; protection; timber; wood chemistry; erosion control; and an investigation [enquiry?] office. The Director controls a staff of 182 technicians and 203 administrative and other employees at Meguro itself; a total of 302 technicians and 497 administrative and other employees are engaged in forestry research throughout Japan.
3. There are 6 subsidiary stations (established in 1950) at Akita, Aomari, Kochi, Kumamoto, Osaka and Sapporo, each of which has one or more substations or experimental forests.
4. Chief subjects of investigation are: pathology, especially in forest nurseries; entomology, especially Pine barkbeetles; fire protection; erosion control; forest soils; the hydrological effects of forest management; nursery and plantation techniques; nutrient requirements of important tree species.

Other Centres of Research: Some laboratories in other ministries do a limited amount of utilization research, e.g. in wood preservation at the Railway Technical Laboratory of the Ministry of Transport. The Forestry Agency also arranges co-operative research with the universities, on the fundamental chemistry of wood. Recent recommendations [1] include (*a*) the early concentration of all forest products research at one centre; (*b*) the transfer of field experimental work and the funds therefor, from the Operations Division of the Forestry Agency to the Forest Experimental Station.

Some research, both fundamental and applied, is also done at the Universities of Tokyo, Sapporo, Kyoto and Fukuoka, e.g. The Wood Research Institute [section] at Kyoto, and applied research, notably in forest management, at certain forestry schools attached to Agricultural Colleges.

SIAM

Division of Silviculture

1–3. Research in forestry other than forest products and utilization is carried out by the Division of Silviculture, set up at Bangkok in 1940. This has 2 sections, for silvicultural research and forest improvement respectively, each with a Chief and 2–5 graduate officers, and 3 experimental stations—Phu-Khae (Central) with 3 graduate officers, Doi Suthep (Northern) with 2, and Ka-Chong (Southern) also with 2. Some of these have substations or regeneration centres, of which there are 9 in all.
4. Current research concentrates on all matters affecting the formation of various types of plantations, e.g. of Teak, of species suitable for fuel and for such industries as paper pulp, matches and packing cases, and of *Casuarina* for fishing stakes; on the natural regeneration of the main forest types, including Mangroves; and on the rehabilitation of denuded catchments by planting with such exotics as *Aleurites*, *Cinchona*, *Eucalyptus* and *Acacia*.

Division of Forest Products Research

1–3. The sole centre for research in forest products and utilization was established at Bangkok in 1933, as the Division of Forest Products Research. There are 5 sections, viz. technical information, botany and zoology, wood technology, research and development in the use of timber and forest products, and biochemistry, each under a graduate officer. There are no subsidiary centres or substations.
4. The current programme includes: study and identification of the less known reserved tree species, with their anatomical and strength characteristics; investigation of specific timbers for specific uses and suitability for impregnation; chemical analysis of wood and important minor forest products.

[1] TRAYER, G. W. Policy & Program for Forest Research in Japan. *Prelim. Stud. nat. Resour. Sect., G.H.Q., S.C.A.P., Tokyo*, No. 64, 1951.

CHIEF FOREST RESEARCH CENTRES IN THE NEAR AND FAR EAST

Research Centres in Continental Europe: *For. Abstr.* 13 (pp. 119–131).

ADDENDA (pp. 127 and 130)

ITALY

(3) Facoltà Agraria e Forestale, Firenze

1. The Faculty of Agriculture and Forestry of Florence University had its origin in the Istituto Forestale founded at Vallombrosa near Florence in 1869. This, in 1912, became the Istituto Superiore Forestale Nazionale and was given University status. The following year it was transferred to the park of Cascine, Florence, and in 1936 after further changes of name and function, it was affiliated to the University of Florence as the Faculty of Agriculture and Forestry, having passed in 1928 from the responsibility of the Ministry of Agriculture and Forestry to that of the Ministry of Education.

2–4. Its Department of Forestry has 6 sections: silviculture; management and mensuration; forest (especially soil) chemistry; wood technology and utilization; forest pathology; and forest hydrology. There are 14 scientists engaged on research, devoted mainly to the following problems: influence of resin tapping on increment and seed production of Italian Pines; methods of seed testing and hastening germination; breeding of Pines; studies on *Quercus cerris*; all in collaboration with the Stazione Sperimentale di Selvicoltura [see *For. Abstr.* 13 (p. 126)]; soil studies in Italian forests; physical and anatomical studies of the woods of Poplars, tapped and untapped Pines, and introduced Eucalypts; biology and control of *Endothia parasitica*; erosion and torrent control in mountain districts; and irrigation and reclamation studies in hill and plain.

(4) Centro di Studio sul Castagno, Firenze

1. The Centre for Chestnut Research, attached to the Forest Experiment Station at Florence, was founded at the instance of the National Research Council, and began work in 1951.

3. A part of Vallombrosa State Forest has been allotted to the Centre for experimental and demonstration purposes. This contains specimens of all the most important species and strains of Chestnut cultivated in Central Italy. It is intended to establish similar experimental Chestnut plantations in Southern Italy.

4. The immediate programme of research covers the following subjects: ecology and distribution of the genus *Castanea*; studies of Italian Chestnut stands, their structure, volume, increment etc.; Italian varieties of *C. sativa*; silvicultural technique; utilization. Research on *Endothia parasitica* disease and breeding of disease-resistant Chestnuts will continue to be carried out jointly by the Silvicultural Department of the Faculty of Forestry at Florence University and the Plant Pathology Research Station at Rome.

PORTUGAL

(6) Junta Nacional da Cortiça, Lisbon

This, the National Cork Association, is not primarily a research organization, but was founded in July 1936 in order to co-ordinate and organize the cork industry. It does, however, include a laboratory for the study and testing of cork and cork substitutes, as well as a technical advisory service for cork growers.

The Laboratório de Estudo e Ensaio da Cortiça (Cork Research and Testing Laboratory) studies all the applications and products of cork, fixes standards and specifications, and tests and certifies the quality of exports.

The Secção de Assistência Técnica aos Subericultores (Technical Advisory Service on Cork Cultivation) gives advice on cork-growing and exploitation in accordance with the findings of the Estação de Experimentação Florestal do Sobreiro e Eucalypto [see *For. Abstr.* 13 (p. 130)].

CORRIGENDUM

We are informed that the **Centre Technique Forestier Tropical** (p. 122) is not administratively attached, as was its forerunner, the 'Section Technique Forestière', to the Section Technique d'Agriculture Tropicale but from 1.1.50 has been entirely autonomous.

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

0 (047.1). PROGRESS REPORTS

2711. **First annual report of the forestry adviser, Gambia, 1950.** Government Printer, Bathurst. 1951. pp. 8. Abbreviation in *For. Abstr.: Rep. For. Adv. Gambia.*

0 (048.1). BIBLIOGRAPHICAL LISTS

2712. PISARSKA, M. Bibliografia polskiego piśmiennictwa leśnego za pięciolecie 1945–1949. [**Bibliography of Polish forest literature for the years 1945–49.**] Państwowe Wydawnictwo Rolnicze i Leśne, Warsaw. 1951. pp. 116. [Pol.]

Contains 2,202 entries classified by the Flury system, with 3 indexes: (1) author, (2) publication, (3) subject.

2713. ERGÜLEÇ, K. [Compiler]. Türkiye ormancilik bibliyografyasi. [**Turkish forestry bibliography.**] *Tar. Bak. Orm. gen. Müd. Yay.* No. 53, 1947. pp. 175. [Turk.]

This covers the period 1857–1946, i.e. from the founding of the Forestry School at Istanbul. In Part I are listed (*a*) the chief maps of concern to forestry (pp. 6–8); (*b*) chief works relating to forestry (pp. 9–43) arranged by author or, where anonymous, by publisher; (*c*) doctoral theses of foresters educated in Germany (pp. 44–6); cyclostyled student's instructional matter (pp. 47–9). Part II is a complete list of forestry articles appearing in various journals, arranged by author under main subject heads. There is also a general author index.

2714. **Asia and Pacific: forestry and forest products: bibliography up to January 1950.** FAO Forestry and Forest Products Working Group for Asia and the Pacific, Bangkok, Thailand. 1951. pp. 156.

Mimeograph: arranged under the primary headings of the Oxford Classification System.

0 (052/054). PERIODICALS

2715. ***Weltholzwirtschaft.*** With Vol. 3, No. 6, 1951, this journal ceases publication as an independent organ and is incorporated with the *Zeitschrift für Weltforstwirtschaft* from Vol. 14, No. 5, 1951, of that journal.

2716. ***Šumarstvo.*** Šumarsko Društvo NRS u Beogradu, Kn. Miloša ul. 7/I, Belgrade. Bi-monthly. Price *Din.*180 p.a.; single copies *Din.*35.

Vol. 4 of this journal ('*Forestry*', published by the Society of Foresters, People's Republic of Serbia) contains 412 pp. Nos. 1–3 include leaflets with summaries in English and French. From No. 4 the table of contents is in Serbo-Croat, English and French, and French summaries follow each article.

2717. ***Orman ve Biz.*** Orman Fakültesi Talebe Cemiyeti, Iskele pasaji No. 270, Büyükdere, Istanbul. Six numbers p.a. Price *Krş.*150 for 6 months; single copies *Krş.*25. Prices abroad double. X.

This new periodical [The Forest and Ourselves] is published by the Students' Association of the Forest Faculty of Istanbul University and 3 numbers are promised each term. No. 1 for January 1952 contains 16 pages and is wholly in Turkish.

0 - - 011. TERMINOLOGY, NOMENCLATURE

See Nos. 2797, 2801, 2813, 3086, 3270–81, 3304, 3373, 3451, 3527.

0 - - 015. MATHEMATICS. STATISTICAL METHODS

See also Nos. 2984, 3213 *et seq.*

2718. HOPMANN, J. Forstmathematik in Forschung und Unterricht. [**Forest mathematics in research and education.**] Forstliche Fakultät, Hann. Münden. 1951. pp. 235. 85 refs. [G.]

A textbook of general and statistical mathematics as applied to forestry.

0 - - 087. APPARATUS, INSTRUMENTS, MACHINERY: GENERAL

2719. **Equipment news.** *Unasylva* 5 (3), 1951 (127–32).

Descriptive notes with photographs of the following, amongst others: Several types of half-track equipment for use with tractors (Roadless Half Track, Blackhawk Half-Track, Rotapede Renault-Dorizon); Le Tourneau Tournaskidder for use with Super C Tournadozer (a tractor-mounted winch manufactured by R. C. Le Tourneau Inc., Peoria, Ill.); Blackhawk Trench Hog (ditch-digging equipment for use with Ford and Ferguson tractors, manufactured by Arps Corp., New Holstein, Wis.); the Bushwhacker [cf. *For. Abstr.* 12 (No. 423)]; the Brush Contractor (a portable circular saw for cutting brushwood, manufactured by Industrial Development Shop, Acton Street, Nashua, New Hampshire); the Rotavator (cultivator for use with tractor and rotor-driven from power take-off, manufactured by Rotary Hoes of England, Station Road, East Horndon, Essex); P.P.K. Earth Drill (a mechanical hole-digger manufactured by Ets.P.P.K., 45–47 Blvd. St.-Denis, Courbevoie-Seine, France); Loggers' Dream [cf. *For. Abstr.* 11 (No. 2894); Sandy Hill Peppy Peeler [cf. *For. Abstr.* 13 (No. 1554)]; and the Delmhorst R.C.I. metal detector (manufactured by Delmhorst Instrument Co., Boonton, New Jersey).

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

111. *The Atmosphere. Meteorology. Climate and Microclimate*

See also Nos. 2857, 2864, 3232–4.

111.2. Radiation and Temperature

See also Nos. 3232–3.

2720. FEHÉR, D., and SZABÓ, E. Vizsgálatok az elemek áthatolo sugárzásának fiziológiai hatásáról XIII. közlemény. A sugárzás befolyása a növények növekedésére és anyagtermelésére. **[Research on the biological effect of the penetrating radiation of elements. XIII. The influence of the radiation on plant growth and the production of plant substance.]** *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (299–317 + 11 photos). 20 refs. [Hu.g.russ.]

Experiments on radiation from coal and a nitrogenous fertilizer showed that radiation stimulates and accelerates growth and promotes the formation of plant substance. [Cf. *For. Abstr.* 12 (No. 50).] *From authors' summary.*

114. *Soil. Soil Science*

114.1. Soil Physics

See also Nos. 2724–5, 2728, 2738–9, 2989.

2721. STEINBRENNER, E. C. **An improved method for determining the water permeability of forest soils.** *Proc. Soil Sci. Soc. Amer. 1950*, 15, 1951 (379–81). 4 refs. L.S.

A modification of the sampling device introduced by Gaiser. [Cf. *For. Abstr.* 11 (No. 2473).]

114.2. Soil Chemistry

See Nos. 2722 *et seq.*

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 2735, 2740, 2767.

2722. DURAND, J. Sur quelques sols de la forêt de l'Akfadou et des environs de Yakouren (Grande Kabylie). **[Some soils of the Akfadou forest and the Yakouren district (Great Kabylia).]** *Annales agronomiques, Paris (n.s.)* 2 (2), 1951 (110–26). 5 refs. [F.] E.M.B.

A study of 9 soil profiles, classified according to their degree of leaching. The vegetation has only a slight influence on the nature of the soil—only, in fact, affecting the humus layer—but is an important indicator of soil texture. The main factors determining the nature of the different profiles are the chemical composition and permeability of the parent rock, and the drainage conditions due to topography.

2723. GHANI, Q. **Effect of Teak plantations on the soils of the evergreen and semi-evergreen forests of East Bengal.** *Pakistan J. For.* 1 (4), 1951 (342–7). 4 refs.

The soils in the semi-evergreen forests are in a delicate balance between the two opposing processes of podzolization and laterization, and great caution should be exercised before altering the balance by converting the semi-evergreen forest to Teak.

2724. OVINGTON, J. D. **The afforestation of Tentsmuir sands.** *J. Ecol.* 39 (2), 1951 (363–75). 4 refs.

At Tentsmuir the Forestry Commission have successfully developed the open heather moorland [on sandy soil] and converted it to close coniferous forest. Observations have been made of the effects of this afforestation by comparing plantations of *Pinus sylvestris* established for 11 and 19 years with an unplanted area. *Calluna vulgaris* shows increased vigour in the shelter of young plantations but is suppressed under the old plantations. Although the watertable fluctuates considerably, it is 17 cm. lower in the old plantation than in the unplanted area. Aeration is greater in the plantations and the effective soil volume is increased as the watertable is lowered. The heather raw humus is replaced by less acid Pine humus with a greater nutrient content. The nutrient content and pH (4·7) of the sand decreases with afforestation. The organic content of the sand is increased in the plantations. A comparison has been made of the ecological conditions at the Tentsmuir and Culbin forests. [Cf. *For. Abstr.* 12 (No. 2925).] *Author's summary.*

2725. FEHÉR, D., DÖME, K., and SASS, S. Vizsgálatok a fásítás természetátalakító hatásáról alföldi szikeseken. **[Research on the modifying effect of afforestation on the alkaline soils of the Hungarian Alföld.]** *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (51–62 + 2 dgms.). 9 refs. [Hu.g.russ.]

An investigation was made of the pH, the chemical content, the hygroscopicity, the capillary action, and the moisture content, of soils under 10- to 12-year-old stands of Oak, Ash and Elm in mixture, *Populus canadensis robusta*, Tamarisk, *Elaeagnus*, *Robinia pseudoacacia*, and *Pinus pinaster*. Results are tabulated and the following conclusions drawn: (1) the protective effect of the trees has improved the moisture content, and the roots of the grasses that have grown up have improved the physical condition of the soil. (2) Humic acid from the leaf humus has considerably reduced the alkalinity of the soil. (3) The N content of the surface layers of the soil has increased. *From authors' summary.*

2726. SHIBAMOTO, T., and NAKAJIMA, Y. **The soils of some natural forests in the Tokyo University Forest, Chichibu.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (57–65). 8 refs. [Jap.e.]

Humus decomposition in stands of *Chamaecyparis obtusa* and *Tsuga diversifolia* is slow; their soils are very acid and have no exchangeable Ca. Soils under *Fagus crenata* are also lacking in Ca. Soils under *Fraxinus commemoralis* contain Ca, probably because the leaves have a high content of lime. *From authors' summary.*

2727. SHIBATA, N., IBARAGI, T., and ISHII, M. **Studies on the influence of variation of forest conditions on the soil. II. Effects of clear felling on soil in Hinoki forest.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (133–5). 6 refs. [Jap.e.]

Chemical properties of soil in 65-year-old Hinoki [*Chamaecyparis obtusa*] forest and in an adjoining clear-felled area were compared, from 1 to 21 years after felling. In the latter: (1) Litter decomposed more rapidly. (2) Acidity and buffering effect of the soil were less. (3) Contents of total N, and exchangeable CaO were increased in the lower horizons. The favourable effects of clear felling are likely to disappear within some years; reforestation should, therefore, be done soon. *From authors' summary.*

2728. SHRADER, W. D. **Differences in the clay contents of surface soils developed under prairie as compared to forest vegetation in the central United States.** *Proc. Soil Sci. Soc. Amer. 1950*, 15, 1951 (333–7). 9 refs. L.S.

A study was made of the different effects of prairie, forest, and prairie/forest vegetation on the clay content of loess-derived surface soils. The forest soils are lower in surface-clay content than the prairie soils, with the transitional soils occupying an intermediate position. The differences, however, are slight in highly developed soils. Under prairie vegetation there is first an increase in surface-soil clay with increasing subsoil clay, followed by a marked decrease in surface clay with further increase in subsoil clay. No constant relationship exists between % clay in the surface soil and % clay in the subsoil in the forest soils. The soils developed under grassland appear to contain more montmorillonitic clay minerals than do the soils developed under forest.

2729. YOUNGBERG, C. T. **Evolution of prairie-forest soils under cover of invading northern hardwoods in the driftless area of south-western Wisconsin.** *Transactions, Wisconsin Academy of Sciences, Arts and Letters, Madison* 40 (2), 1951 (285–9). 4 refs. K.

The study of soils under mixed Oak and Maple/Basswood indicates that the occurrence of the northern hardwood type is associated with a more advanced stage in soil development, thus being the initial stage of either soil or vegetational climax.

2730. TARRANT, R. F., ISAAC, L. A., and CHANDLER, R. F. JR. **Observations on litter fall and foliage nutrient content of some Pacific Northwest tree species.** *J. For.* 49 (12), 1951 (914–5).

Gives annual oven-dry weight of litter fall, nutrient content of foliage (lb./acre), and soil pH at 3 depths under the following species: *Thuja plicata, Pseudotsuga taxifolia* (100 and 350 years old), *Abies amabilis, Acer macrophyllum, Pinus monticola, Alnus rubra, Tsuga heterophylla, Picea sitchensis, Pinus ponderosa* (100 and 350 years old), and *Pinus contorta* var. *latifolia.*

2731. LUNT, H. A. **Liming and twenty years of litter raking and burning under Red (and White) Pine.** *Proc. Soil Sci. Soc. Amer. 1950*, 15, 1951 (381–90). 16 refs. L.S.

On 6 plots in a 27-year-old *Pinus resinosa* plantation on loamy sand, annual litter removal by raking was compared, over a period of 19 years, with annual litter burning and with undisturbed litter, each with and without liming (ca. 4,000 lb./acre). A similar series under *P. strobus* of the same age was destroyed after 9 years' treatment. On a 7th *P. resinosa* plot the natural forest floor was supplemented annually with litter from two raked *P. resinosa* plots ['Triple A_0']. Under *P. resinosa* the initial forest floor averaged 27,800 lb./acre and annual needle fall 3,555 lb./acre. In undisturbed plots the average gain of litter was 212–258 lb. p.a. despite an annual decomposition rate of some 3,300 lb./acre. In the triple A_0 plot the net gain averaged 1,722 lb. p.a. against an annual decomposition of no less than 7,927 lb./acre. Annual needle fall varied from 1,640 to 5,500 lb./acre but increased for each 5-year period. In the *P. strobus* plots the initial weight was less, but the annual needle fall 21% greater than under *P. resinosa*. White Pine litter had higher ash, total N and available P and SiO_2 contents than Red Pine. With both species, liming (1929, repeated 1930) greatly increased the exchangeable Ca. Tree measurements of Red Pine show relatively small differences in d.b.h. and total height, with somewhat more marked differences in volume. Raking had a small, but definitely detrimental effect on certain soil properties and tree growth. Burning favoured both height and volume growth. Best growth of all occurred in the triple A_0 plot. Liming also influenced growth favourably.

2732. LAFOND, A. **Morphology and specific conductance of forest humus and their relation to the rate of forest growth in Wisconsin.** *Transactions, Wisconsin Academy of Sciences, Arts and Letters, Madison* 40 (1), 1950 (207–11). 5 refs. K.

Twenty different humus samples belonging to the 4 main groups: earth mull, duff mull, true mor, and infiltrated mor, were subjected to the following determinations: pH, sp. gr., loss on ignition, and specific electrical conductivity for samples before and after centrifuging. The difference between these two conductivities is claimed to be a measure of the proportion of readily dispersible colloids. Duff mull and infiltrated mor types were found both to have a greater conductivity and to contain a large proportion of these non-conductives, compared with the two other humus types; duff-mull soils in Wisconsin are characterized by the highest rate of forest growth, sometimes exceeding 600 bd. ft./acre.

2733. PIERCE, R. S. **Prairie-like mull humus, its physico-chemical and microbiological properties (a contribution to the classification of forest humus).** *Proc. Soil Sci. Soc. Amer. 1950*, 15, 1951 (362–4). 6 refs. L.S.

Presents results of a profile analysis of one of the most conspicuous humus forms of the prairie-forest region. This is characterized by the enormous depth (approaching 2 ft.) of the horizon with incorporated organic matter.

2734. WILDE, S. A. **Crypto-mull humus: its properties and growth effects (a contribution to the classification of forest humus).** *Proc. Soil Sci. Soc. Amer. 1950*, 15, 1951 (360–2). 13 refs. L.S.

Presents the results of a study of the soil and forest cover in an Oak/Yellow Poplar [*Liriodendron tulipifera*]/Beech stand in Indiana, possessing a crypto-mull humus (i.e. a surface horizon in which rapid and nearly complete breakdown of forest litter has taken place, leaving little or no dark-coloured products to infiltrate into the mineral soil). In spite of the apparent humus deficiency, organic matter carrying a considerable amount of total N is distributed through the entire profile. The observations indicate that the organic fraction is inseparable from the mineral body of the soil, and the author suggests that an expansion of the humus classification used in Central Europe is necessary to include such types.

114.4. Soil Classification. Soil Types

See also Nos. 2728–9, 2736, 2741–2, 2963.

2735. YAMAYA, K. **Pedological studies of brown forest soils in Hiba [*Thujopsis dolabrata*] forest regions. 1. Morphological features and classification. 2. Humus types and physical and chemical properties. 3. Chemical composition and molecular ratio.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (140–7). 28 refs. [Jap.e.]

Chemical, but not profile, characteristics indicate weak podzolization, particularly at higher altitudes.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 2731–2, 2767, 2909, 3058, 3206, 3226, 3240, 3345.

2736. HARDY, F. **Soil productivity in the British Caribbean region.** *Trop. Agriculture, Trin.* 28 (1/6), 1951 (3–25).

A study of the ecology of the region and of the soil types with an account of their chief features, occurrence, and suitability for agriculture. In an appendix are described the differences between forest and field soils and the nature of the transition from one to the other.

2737. JÁRÓ, Z. A mátrai bükkerdötipusok talajvizsgélata. [**An examination of forest soils of different types of *Fagetum* in Mátra.**] *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (365–81). 10 refs. [Hu.f.g.russ.]

An examination of 8 types of *Fagetum* showed that the three factors indicating site quality are tree height, nature of ground cover, and soil chemistry. Where the first two factors give doubtful results, the carbon content of the A and B horizons (determined by the permanganate method) will give a reliable indication of the degree of soil impoverishment. *From author's summary.*

2738. ZIN, K. **The relationship between the volume ratio, solid : liquid : gas, in soil to growth of trees and vegetation.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (147–9).

When the volume ratio of solid, liquid, and gas, is expressed by S : L : G, a close relation is found between tree growth and L/S. Except in areas with stagnant water, trees in soil with a high L/S value are generally vigorous in growth. In a stand of *Pinus densiflora* (soil depth up to 45 cm.) the good sites had an L/S value of 25/11, medium sites 10/7, and poor sites 6/1. In a stand of *Cryptomeria japonica*, the better sites also had a higher L/S value. With *Chamaecyparis obtusa*, the L/S value was higher and the G value lower on the better sites. In a forest of *Thujopsis dolabrata* (soil depth up to 40 cm.), the L/G value agreed closely with the vegetation there, and is a better criterion than moisture alone. *From author's summary.*

114.6. Soil Biology

See also No. 2733.

2739. VERONA, O. L'influenza sulla microflora del suolo di un correttivo della struttura. [**The effect of a soil-structure improver on the soil microflora.**] *Ital. agric.* 89 (1), 1952 (15–21). 6 refs. [It.] E.M.B.

Reports an experiment with Flotal, a new substance for improving the texture of stiff and clayey soils by accelerating flocculation of mineral colloids. It was found that treatment with Flotal increased both bacterial and fungal floras significantly. [Cf. *For. Abstr.* 13 (p. 351).]

2740. IWAMURA, M. **Biological studies on forest litter. (2) Ecological observations on litter fauna.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (131–2). [Jap.e.]

Freshly cut sticks of 2 conifer and 9 hardwood species laid in the litter in 4 experimental areas (in *Castanea, Fagus/Cryptomeria*, mixed hardwood, and *Cryptomeria* forests) were largely attacked by Coleoptera, especially Cerambycidae, Ipidae, and Curculionidae. Sticks with gimlet holes resembling galleries of Coleoptera were attacked by fungi more than the controls. The results indicate that beetle attack aids the breakdown of fallen branches by fungi. *From author's summary.*

114.7. Soil Surveys and Surveying

2741. WIJK, C. L. VAN. **Soil survey of the tidal swamps of South Borneo in connection with agricultural possibilities.** *Tectona* 41 (2), 1951 (75–110 + map). 29 refs. [E.]

Includes some account of the natural vegetation.

2742. SMITH, R. **Soils of Margaret and lower Blackwood River districts, W.A.** *Bull. Commonw. sci. industr. Res. Organ. Aust.* No. 262, 1951. pp. 51 + 4 maps.

Most of the area covered by this soil survey carries Jarrah or Karri forest.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 2883, 2966, 2970–3, 3522, 3526

2743. ROWE, P. B., and COLMAN, E. A. **Disposition of rainfall in two mountain areas of California.** *Tech. Bull. U.S. Dep. Agric.* No. 1048, 1951. pp. 84. 26 refs.

Summarizes the results to date of studies in interception, transpiration, streamflow etc. in chaparral, and the effects of burning, made at North Fork and San Dimas, Calif. [Cf. *For. Abstr.* 10 (No. 1588); 11 (No. 2497).]

2744. ROWE, P. B., and HENDRIX, T. M. **Interception of rain and snow by second-growth Ponderosa Pine.** *Trans. Amer. geophys. Union* 32 (6), 1951 (903–8). 6 refs. H.S.B.

Amounts of precipitation intercepted by the canopy, and amounts reaching the forest floor directly by penetration of the canopy, drip or stem-flow, were measured over a period of 6 years in a *Pinus ponderosa* stand in California. The average annual precipitation was 47 in., of which 84% reached the floor by penetration or drip, and 4% through stem-flow; 12% was intercepted, either being retained by the vegetation during the initial wetting or lost in evaporation. An average of 4% more precipitation reached the forest floor during snow than during rain storms.

2745. HAUPT, H. F. **Snow accumulation and retention on Ponderosa Pine lands in Idaho.** *J. For.* 49 (12), 1951 (869–71).

Measurements made in 1935, 1936 and 1937 on typical steep sites are discussed. Maximum accumulation and retention of snow were found on north aspects and grew progressively less on east, west and south aspects. Sapling stands gave highest retention of snow on all aspects, followed by small brush openings on east, west, and south aspects and large brush openings on north aspects.

2746. REIGNER, I. C. **Erosion studies on the Schoharie watershed, New York.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 44, 1951. pp. 17.

A sedimentation survey was made on the reservoirs, and a land-use survey on the catchment area. The latter showed that more than 80% of moderately eroded land was in grass and only 18% in forest cover. Supplementary studies were made on road banks, stream banks, the reservoir shores, and in logging areas. Most of the logging sites examined showed little or no erosion damage. Results are tabulated.

2747. TAKEDA, S. **The annual discharge and the increased run-off caused by heavy rain.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 50, 1951 (1–96). 18 refs. [Jap.e.]

Gives particulars of investigations on streamflow and run-off for the catchment area of the Honryu and its tributary, the Shozawa.

2748. STALLINGS, J. H. **Mechanics of wind erosion.** Soil Conservation Service, U.S. Department of Agriculture. 1951. pp. 12. 11 refs.

2749. BOUDY, P. Considérations sur le problème de la défense et de la restauration des sols (États-Unis, Afrique du Nord). **[Soil conservation and restoration in the U.S.A. and North Africa.]** *Bull. Soc. for. Franche-Comté* 27 (4), 1951 (174–211). [F.]

A general account and comparison of soil erosion problems and control methods in the U.S.A. and the French territories in the North of Africa.

2750. KAWAGUCHI, T., WATANABE, R., and TAKIGUCHI, K. **Study of landslides on Mt. Akagi.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 49, 1951 (11–78). 31 refs. [Jap.e.]

It was concluded, *inter alia*, that landslides occur alike on forested and treeless sites and in both coniferous and hardwood forests, irrespective of age, since natural factors (geology, soil, rainfall) favour instability of slope. Remedial measures are enumerated.

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 2788–9, 3131 *et seq.*, 3418, 3432–9.

2751. BERGOLD, G. Fortschritte und Probleme auf dem Gebiete der Insektenviren. **[Advances in and problems connected with virus diseases of insects.]** *Z. angew. Ent.* 33 (1/2), 1951 (267–78). Numerous refs. [G.]

A review of world literature.

2752. HERING, E. M. **Biology of the leaf miners.** Uitgeverij Dr. W. Junk, 's-Gravenhage. 1951. pp. iv + 420 + 2 plates. 1,363 refs. [E.] Price £3. 10*s.*

2753. BROADBENT, L., and HOLLINGS, M. **The influence of heat on some aphids.** *Ann. appl. Biol.* 38 (3), 1951 (577–81). 6 refs. O.R.E.

The thermal death-points of 5 aphid species, viz. *Aulacorthum solani*, *Acyrthosiphon pisum*, *Macrosiphum euphorbiae*, *Myzus persicae* and *Brevicoryne brassicae*, removed from their host plants, lay between 38 and 41° C., when tested for 1 hr. at 60% relative humidity. No *M. persicae* recovered and reproduced after 1 hr. above 37·5° C. Aphids on plants, however, withstood temperatures higher than their thermal death-point off the plant. *From authors' summary.*

2754. SCHMUTTERER, H. Zur Kenntnis der Buchenblattlaus *Phyllaphis fagi* (L.) (Homoptera, Aphidoidea), einer wichtigen Honigtauerzeugerin auf Buche. **[The Beech aphid *P. fagi*, an important producer of honey-dew on Beech.]** *Anz. Schädlingsk.* 25 (1), 1952 (1–5). 11 refs. [G.g.]

Notes on the life history of the aphid.

2755. DAVIAULT, L. La tordeuse à tête verte de l'épinette: *Tortrix packardiana* Fern. **[The Fir tortrix, *T. packardiana*.]** *Ann. ACFAS* 16, 1950 (147–51). 3 refs. [F.] L.S.

Notes on the biology of the tortrix and its natural enemies, with particular reference to parasites.

2756. BALCELLS, E. El ciclo biológico de *Dicranura vinula*, L. y *Smerinthus populi*, L., en el Vallés oriental (Barcelona). **[The life cycle of *D. vinula* and *S. populi* in eastern Vallés (Barcelona).]** *Publicación Instituto de Biología Aplicada, Barcelona* 8, 1951 (189–207). 24 refs. [Span.e.]

2757. PATOČKA, J., and PAŠEK, V. Přispěvek k otázce sexuálního indexu u housenek rodu *Lymantria*. **[On the sexual index of larvae of the genus *Lymantria*.]** *Lesn. Práce* 29 (3/4), 1950 (80–5). 2 refs. [Cz.russ.e.f.]

Describes a method enabling the sex of 200 larvae per hour to be determined and gives preliminary results for *L. dispar* and *L. monacha.*

2758. SAALAS, U. Einiges über Charakterarten der Käferbestände an Fichten von verschiedener Beschaffenheit. **[Nature of beetle populations on Spruce of varying character.]** *Z. angew. Ent.* 33 (1/2), 1951 (12–8). 4 refs. [G.]

The author found, during many years of field work, that some types of insect population inhabit trees with certain definitely recognizable characteristics. He presents some data on the distinguishing features for Spruce which he connects with some of the more important Coleoptera and associated species.

2759. ZACHER, F. Die Nährpflanzen der Samenkäfer. **[Food plants of the Bruchidae.]** *Z. angew. Ent.* 33 (1/2), 1951 (210–7). [G.]

Presents lists of food plants of the larvae and food plants chosen for maturation feeding.

2760. HADLINGTON, P. **The bark beetles (Scolytidae).** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 5 (2), 1951 (26–30).

Records and describes species found in New South Wales.

15. ANIMAL ECOLOGY (INCLUDING GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING)

See also Nos. 2751–60, 3126 *et seq.*

2761. MARSHALL, W. H. **Pine marten as a forest product.** *J. For.* 49 (12), 1951 (899–905). 19 refs.

Discusses possible management measures for increasing the production of furs.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 2730–1, 2768, 2909, 3058, 3331 *et seq.*, 3483 *et seq.*

2762. FRIES, N. **Variations in the content of phosphorus, nucleic acids and adenine in the leaves of some deciduous trees during the autumn.** *Plant & Soil* 4 (1), 1952 (29–42). 44 refs. [University of Uppsala.]

161. *Physiology*

See also Nos. 2720, 2762, 2786–7, 2818 *et seq.*, 2851–2, 2909, 2912, 3107–8, 3125.

2763. CARLES, J., and RIVENQ, F. L'afflux printanier des minéraux dans les fleurs et les fruits du maronnier (*Aesculus hippocastanum*). **[The spring influx of minerals into the flowers and fruits of *A. hippocastanum*.]** *C.R. Acad. Sci., Paris* 233 (10), 1951 (583–5). [F.f.] O.R.S.

N and P appear first and Na and Ca last in the flowers and young fruits.

2764. ITÔ, E., and MORISHITA, T. **The relationship of a few physiological characteristics to the transpiration tissue in needles of *Pinus thunbergii* and *P. densiflora*.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (119–22).. 6 refs. [Jap.e.]

Needles were collected from 1-, 2- and 3-year-old seedlings and from 5-, 10-, 20- and 30-year-old trees. The following results were obtained: (1) The average number of stomata per sq. mm. leaf surface was about 50 for both species. (2) Diameters of the respiratory cavity opening in Red Pine were larger than in Black Pine. (3) The cavity was shallower in Red than in Black Pine. (4) The epidermis was thicker in Black than in Red Pine. (5) The hypodermis in Red Pine was made up of 1–2, and in Black Pine of 2–3 layers. These results indicate that Black Pine has a lower transpiration rate and is more resistant to smoke and salt injury than Red Pine. *From authors' summary.*

2765. SATOO, T. **Leaf temperature in relation to the influence of wind on transpiration of plants. I-III.** *Bull. Tokyo Univ. For.* No. 39, 1951 (31–54). 15 refs. [E.e.jap.]

Experiments were made with different species (*Cryptomeria japonica, Quercus myrsinaefolia, Cinnamomum camphora, Lithocarpus edulis,* and *Shiia sieboldi*) to ascertain the effect on the rate of transpiration of changing the temperatures of leaves and needles by adding water of different temperatures to the cut shoots and by exposing the shoots to electric light, direct or filtered through water. The experiments took place either in calm air or under exposure to wind. The following results were obtained. (1) Transpiration rates of *C. japonica* and *Q. myrsinaefolia* increased with rising temperature of the water supplied in calm air, were accelerated by wind when water nearly freezing was supplied, but were decreased by wind when the water temperature was 10° C. and over. The temperature of the leaves and needles increased with that of the water supplied, and when exposed to wind dropped nearly to air temperature. (2) The temperature of leaves and needles of *C. japonica, L. edulis, S. sieboldi* and *C. camphora* exposed to direct light was higher than of those exposed to light filtered through water, and both were higher than air temperature. Exposure to wind reduced all temperatures nearly to air temperature. (3) The rate of transpiration in calm air was higher from needles and leaves exposed to direct than to filtered light. The rate for all 4 species under direct light decreased considerably when they were exposed to wind, while for those under filtered light it showed no consistent trend, increasing for *C. japonica*, decreasing for *L. edulis* and *S. sieboldi*, and showing no significant change for *C. camphora*. (4) When shoots of *L. edulis* were exposed directly to (*a*) 500- and (*b*) 100-watt bulbs and (*c*) through a water layer to a 500-watt bulb, the transpiration rate was highest for (*a*) and lowest for (*b*). When the shoots were exposed to wind, it increased under filtered light and decreased under direct light for both (*a*) and (*b*). When the rate was increased by wind it increased more from young leaves, and when it was decreased, it decreased more from old leaves. Temperature was highest in leaves exposed to (*a*) and lowest for (*c*); it was higher in young than in old leaves, and in all cases exceeded air temperature. When shoots were exposed to wind, it dropped nearly to air temperature.

2766. CZARNOWSKI, M. Przyczynek do znajomości zimowej zdolności transpiracyjnej niektórych topoli. **[The rate of winter loss of water from some Poplars.]** *Sylwan* 95 (3/4), 1951 (338–43). 7 refs. [Pol.russ.]

Investigation of the loss of water by twigs of various Poplar species and hybrids has shown that, contrary to the findings of L. Ivanov (1924), the genus *Populus* presents no exception to the general

rule that southern species lose more water than northern ones of the same genus.

2767. LAFOND, A. **The rate of respiration of Jack Pine root tips as influenced by extracts from different types of humus.** *Proc. Soil Sci. Soc. Amer. 1950*, 15, 1951 (357–9). 3 refs. L.S.

The extracts tested were taken from (1) Jack Pine sand mull, (2) Jack Pine matted mor, (3) Black Spruce matted mor, and (4) Oak crumb mull, (3) and (4) both being taken from stands with a low growth rate. There were pronounced differences in the effects of the different humus extracts on O_2 uptake. The effects of (1) and (2) on CO_2 releases were normal; (3) and (4) gave an accelerated CO_2 release followed by a retarded activity of the enzymatic system. In order to study the degree of stimulation, the values for maximum O_2 uptake and CO_2 release were related to the values before the addition of humus extracts. In this experiment two additional extracts were studied, viz. (5) Hard Maple/Yellow Birch coarse mull, and (6) Balsam Fir friable mor, both from highly productive stands. (1) and (2) gave about the same stimulation for O_2 uptake and CO_2 release; (3) and (4) gave low stimulation of O_2 uptake and high stimulation of CO_2 release, whereas (5) and (6) gave inverse effects to (3) and (4). The respiratory quotients (i.e. the CO_2 release/O_2 uptake ratio) of these 6 humus types were calculated and show that humus types from Jack Pine and from productive forest stands induce a normal course of metabolism in homogenized tissue. Types from poor growing stands show high respiratory quotients immediately after the addition of humus extracts, i.e. a sign of pronounced decarboxylation, indicating a general inhibition rather than a stimulation of growth.

2768. HATTORI, S., and SHIROYA, T. **The sugars in the seeds and seedlings of *Pinus thunbergii*.** *Arch. Biochem.* 34 (1), 1951 (121–34). 16 refs. [E.] [Botanical Institute, University of Tokyo.] O.R.S.

Raffinose, stachyose and sucrose were present in the resting seeds of *P. thunbergii*. The first two disappeared and sucrose increased considerably, in germinating seeds. Reducing sugars were not observed in resting seeds but were found as soon as germination began. Free galactose and di- or trisaccharide with galactose as a component, could not be found during germination. In the resting seeds, α-galactosidase activity was conspicuous, and invertase activity appeared to be absent; in both germinated and grown seedlings, however, the enzyme activity of the former was low and that of the latter high.

2769. ZENTMYER, G. A. **A substance stimulating sexual reproduction in *Phytophthora cinnamomi*.** *Abstr. in Phytopathology* 42 (1), 1952 (24).

A chemical present in roots of Mexican Avocado [*Persea gratissima*] was found to stimulate the production of the sexual stage in *P. cinnamomi*, a fungus that rarely produces oospores in culture. Similar extracts of the roots of other hosts did not have the same effect. The Avocado extract also stimulated oospore formation in *P. drechsleri*, but not in other *Phytophthora* spp.

2770. [FENSOM.] **Biopotentials in trees and their relation to growth, vitality, periodicity and perturbation.** *Progr. Rep. Field Lab. Proj. Ont. Dep. Lds. For. 1950/51*, 1951 (44–6).

The experiments were carried out on *Pinus resinosa* trees. (1) The potential difference between the cambial region at the base of the tree and the ground (base-ground potential) and/or the potential difference between the cambium at the base and at higher points on the tree (stem potentials) were obtained by using non-polarizing electrodes. (2) The potential differences in the radial direction through the trunk were obtained by special stainless-steel electrodes suitable for penetrating into the hard tissues. The range of potential observed was from 25 to 300 millivolts. The cambium is the most negative part of the normal tree, and a characteristic pattern of potential is displayed when the tree is explored in any direction. There are also periodic changes in potential, apparently related to the known diurnal periodicity in activity. Normally growing trees of one age-group at a single locality agree in their biopotential characteristics. Trees disturbed by chemical, physical, or parasitic influence, reflect the disturbance by characteristically abnormal biopotential patterns. Dead trees show no patterns.

Trees affected at the butt by fungal or borer invasion showed reversed stem potentials and abnormally high base-ground potentials. Pruning or partial defoliation caused a marked drop in both stem and base-ground potentials. Root-pruning resulted in depression of the base-ground but no change in the stem potentials. Trees strangulated 4 ft. above ground level were depressed in base-ground and reversed in stem potential. Observations on trees sprayed with synthetic growth substances indicated that light treatment augmented potential, but as treatment became increasingly severe, augmentation passed progressively into depression until death ensued.

The results indicate that a wide range of disturbances is reflected in the biopotential patterns, and it seems probable that the method could be used for distinguishing effects that would otherwise remain unobserved and for anticipating slowly developing effects. For instance, the biopotential changes indicated that TIBA [triiodobenzoic acid] is physiologically active in the Red Pine though no external effects were visible after treatment. [Cf. *For. Abstr.* 13 (No. 2912).]

164. *Morphology*

See also Nos. 2764, 2772, 2781, 2802–3, 2818, 2835.

2771. BUGNON, P., and BUGNON, F. **Feuilles juvéniles et pousses multinodales chez le pin maritime. [Juvenile foliage and multinodal shoots on *Pinus pinaster*.]** *Trav. Lab. for. Toulouse* 1 (5) Art. 4, 1951. pp. 6. 3 refs. [F.]

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 2849–50, 2897 *et seq.*, 2909, 3538.

2772. CAMPO-DUPLAN, M. VAN. **Recherches sur la phylogénie des taxodiacées d'après leurs grains de**

pollen. **[The phylogeny of the Taxodiaceae as shown in their pollen grains.]** *Trav. Lab. for. Toulouse* 2 (4) Art. 2, 1951. pp. 14. 28 refs. [F.]

2773. LANGNER, W. **Die Forschungsstätte für Forstgenetik und Forstpflanzenzüchtung in Schmalenbeck. [The Schmalenbeck Research Station [of the Bundesanstalt für Forst- und Holzwirtschaft] for Forest Genetics and Tree Breeding.]** *Z. Weltforstwirt.* 15 (1), 1952 (15–9). [G.e.f.]

An account of its work since its establishment in 1948.

2774. SCHÖNBACH, H. **Stand der Provenienz- und Züchtungsforschung bei Fichte. [The state of research on provenance and breeding in Spruce.]** *Züchter* 20 (5/6), 1950 (156–67). [G.] A.P.B.

A discussion of results, mainly German.

2775. HEIMBURGER, C. **Report on forest tree breeding: White Pine.** *Progr. Rep. Field Lab. Proj. Ont. Dep. Lds. For. 1950/51*, 1951 (47–50).

A method was developed to thaw out potted Pine stock stored out of doors in cold frames, by means of an electric heating cable. The material was then brought into the greenhouse, forced to produce new growth, and grafted. After grafting, the plants were placed in closed frames inside the greenhouse and remained there until union of stock and scion occurred. In the season under review this method yielded 89% successful grafts.

Outside grafting, developed in 1948 and perfected in 1949 was used for mass propagation of *Pinus mugo* and *P. densiflora*, which were grafted into a plantation of Scots Pine. Experiments with outside grafting in the autumn, started in 1949, gave valuable results. Outside grafting in September was unsuccessful, but White Pine can be grafted in October when cool weather sets in. It was also possible to graft hard Pines in October, but only if one of the partners was a White Pine; thus it was possible to graft White Pine on *P. sylvestris*, and *P. mugo* on White Pine in October but grafting of *P. mugo* on *P. sylvestris* was unsuccessful, though this graft succeeds easily in the spring.

Artificial crossing of White Pines in 1949 yielded some 3,000 supposedly hybrid seeds. This is the first time that hybrid White Pine seeds have been obtained with both parents resistant to blister rust. Artificial crossing was continued in 1950 using very vigorous *P. strobus* as ♀ parents, and pollen from good *P. excelsa* [*P. wallichiana*] and *P. peuke*. These crosses had previously been found quite feasible and yielded very promising and vigorous hybrids.

Trials with various kinds of pots for White Pine transplants to be used as stocks for grafting, were decidedly in favour of clay pots. Paper pots did not stand up to greenhouse forcing, and their use has been discontinued. Strangulation and partial girdling of young trees to induce flowering was ineffective; grafting on suitable stock, followed by root pruning, appears to be more suitable with this species.

2776. HEIMBURGER, C. **Report on forest tree breeding: Poplar.** *Progr. Rep. Field Lab. Proj. Ont. Dep. Lds. For. 1950/51*, 1951 (50–3).

Cuttings of the so-called Black Italian Hybrids produced at Casale Monferrato, were obtained from trees grown in England, and are being propagated as rapidly as possible, as these hybrids seem to be exceptionally well suited to conditions in Ontario.

A large collection of material from Europe and the U.S.A. has been assembled for work on the Aspen group. A method has been found for rapidly building up stock of this kind by grafting it on vigorously growing Aspen suckers. Instead of the bark grafting used formerly with rather poor success and restricted to a relatively short period in the spring, cleft grafting has been tried with excellent results; the % of success is almost doubled and the working period is much longer. As an example, from a handful of scions received from Czechoslovakia it has been possible to build up material yielding 800 cuttings from side-branches in one growing season.

Scions of a new form of triploid Aspen from Sweden [cf. *For. Abstr.* 10 (No. 918)] were received. This clone seems not to slow down its growth in the short-day climate of Ontario and promises to be valuable.

Work with induction of early flowering by using the dwarf variety of *Populus tremuloides* occasionally found in S. Ontario, is beginning to give results. In the spring of 1949 some scions made of root suckers of Polish Aspen were grafted into the crown of such a dwarf; during that year the material produced juvenile sucker-like growth, but in 1950 this changed into an adult type of foliage, and flower buds formed in the axils of some leaves. [Cf. *For. Abstr.* 13 (Nos. 2785–6).]

2777. BRITTON, D. M. **Cytogenetic studies on the Boraginaceae.** *Brittonia, N.Y.* 7 (4), 1951 (233–66). Numerous refs.

Presents chromosome numbers of 90 species and varieties, and discusses generic relationships and phylogeny on the basis of chromosome numbers and chromosome morphology.

2778. KHAN, M. I.-UR-R. **Study of somatic chromosomes in some *Acacia* species and hybrids.** *Pakistan J. For.* 1 (4), 1951 (326–41). 33 refs.

New chromosome numbers were recorded for *A. senegal*, *A. mellifera* and *A. modesta* ($2n = 26$ for each). Two hybrids of *A. decurrens* × *A. mollissima* also had $2n = 26$. An apparent hybrid *A. senegal* × *A. mellifera* showed $2n = 39$ or 40 in the somatic nucleoli of its progeny. No natural or artificial triploid *Acacia* has been reported so far. Of the two tetraploid species studied, *A. arabica* showed 4 pairs of nucleoli, and *A. farnesiana* only 3 pairs. The loss of a pair in the latter species is inferred to be due to mutation in the course of evolution. The Australian species of the *decurrens* group resemble each other in chromosome morphology; on the basis of relative chromosome length, *A. decurrens* appears to be the most highly evolved species and *A. dealbata* the most primitive. The scope and possibilities of artificial hybridization and induced polyploidy are discussed. *From author's summary.*

2779. CHIBA, S. **Triploids and tetraploids of Sugi (*Cryptomeria japonica* D. Don) selected in**

the forest nursery. *Bull. For. Exp. Sta. Meguro, Tokyo* No. 49, 1951 (99–109). 14 refs. [E.e.jap.]

Of 39 seedlings selected, 28 were found by chromosome observation or by stomatal appearance to be tetraploids ($2n = 44$), 3 to be triploids ($2n = 33$) and 8 to be diploids ($2n = 22$). Tetraploids were of giant form, their needles were thick and wide and often twisted, and the stomatal band showed the same irregular arrangement as in tetraploids induced by colchicine treatment. The triploids showed a tendency to giant form for several months after germination, but this disappeared after a year; their needles were a little thicker than those of diploids. The ratio of the length of guard cells for tetraploids, triploids and diploids was 130 : 118 : 100 and that of the number of stomata per unit area was about 50 : 75 : 100. Cell size at metaphase was greater in both length and width for tetraploids and triploids than for diploids.

2780. Illies, Z. M. Colchicinversuche an *Larix decidua* Miller und *Picea abies* (L.) Karst. [**Experiments with colchicine on *L. decidua* and *P. abies*.**] *Z. Forstgenet.* 1 (2), 1952 (36–9). 16 refs. [G.g.]

Cytological investigations of 2-year-old plants grown from colchicine-treated seeds showed that some were tetraploid, and others tetraploid in some tissues and diploid in others. From the treated seed tetraploid, mixoploid and diploid Larch were produced, all of which had fewer, shorter and thicker needles than the controls. Tetraploid and mixoploid Spruce were characterized by shorter and darker needles. On a C_0 Spruce one shoot having a normal appearance, proved to be mixoploid. The author suggests that in these 2-year-old plants the chromosome number may be in process of being 'levelled down' without the plants having yet regained the normal growth habit. [Cf. *For. Abstr.* 13 (Nos. 76; 2928).]

2781. Stecki, K. O formach i rasach sosny. [**Forms and races of Pine.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 7, 1951 (202–3). [Pol.]

Long, well-developed, straight stems of Pine in Poland are usually associated with the *plana* form of cones; poorly formed, weak stems with the *gibba* form.

2782. Behrndt, G. Zur Birkenzüchtung. [**Selective breeding of Birch.**] *Z. Forstgenet.* 1 (2), 1952 (33–5). 8 refs. [G.]

Presents the results of investigations made from 1935 to 1939 in the forestry division of the Kaiser Wilhelm Institut für Zuchtüngsforschung in Münchеberg-Mark. The data are based mainly on the recollections of the author (the original documents having been destroyed) and relate to studies of a particular type of Birch found in E. Prussia, Pomerania and Brandenburg. The wood of these trees, which are characterized by a smooth greyish-white bark that peels off in thin strips or scales, was found to be highly suitable for aircraft construction. Such trees are only found on heavy clay soils with a high watertable, but their existence side by side with Birch having the more common, rough black-and-white bark, and lower strength properties, indicates that the site is not the main factor determining the type of tree, but that this is a definite, genetically determined strain of *Betula verrucosa*. Experiments in selfing have produced completely sterile trees. The author reports on and discusses trials to select high-yielding strains of this tree.

2783. Saitō, Y. **Several examples of intermediate forms between Japanese Black and Red Pine.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (126–7). [Jap.e.]

Intermediate forms can be divided into two main types, one resembling Black and the other Red Pine. Those with the position of the resin canals in the needles resembling that of either Black or Red Pine will be similar in other characteristics (tree height, needle, cone and seed). The seed from intermediate forms was of poor quality, and germination was generally low except in one instance. Pollen germination tests gave a maximum of 87%. *From author's summary.*

2784. Kobendza, R. Wartościowy mieszaniec lipy węgierskiej i szerokolistnej, *Tilia varsaviensis* (*T. argentea* × *T. platyphyllos*). [**A valuable hybrid, *T. varsaviensis* (*T. argentea* × *T. platyphyllos*).**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 7, 1951 (159–74). 3 refs. [Pol.f.]

Describes the new natural hybrid, found in the municipal plantations of Warsaw. It differs from *T. argentea* in its denser, conical crown and in some bud and leaf features. The foliage remains green very late into the autumn. It is being propagated by shield budding on the root-collar of *T. platyphyllos*.

2785. Bugała, W. Euro-amerykańskie mieszańce topoli czarnych, zich naczenie oraz krótki przegląd dotychczasowych osiągnięć hodowli topoli w ZSRR. [**Euro-American hybrids of Black Poplars, their practical value, and a short review of achievements to date in Poplar breeding in the USSR.**] *Sylwan* 95 (3/4), 1951 (324–38). 24 refs. [Pol.e.]

Euro-American Black Poplar hybrids are crosses between *Populus nigra* and *P. deltoides*. Guinier has recently suggested the designation *P. euro-americana* followed by the individual breeding number. The following hybrids are described in detail: *P. serotina*, *P. marilandica*, *P. regenerata*, *P. eugenei*, *P. brabantica*, *P. gelrica*, and *P. robusta*. *P. serotina* is very common in Poland; *P. marilandica* is found predominantly in W. and N.W. Poland; *P. robusta* has been grown in Poland only since 1920–30; and other hybrids are only known in arboreta. Results are summarized of the work done by Jablokov, Berezin, and Bogdanov in the USSR during the last two decades, on the hybridization of Poplars, using mostly *P. tremula* as the mother tree. [Cf. *For. Abstr.* 7 (Nos. 87; 211); 12 (No. 1769); 13 (Nos. 2776).]

168. *Histology*

See also Nos. 2764, 2951, 3290 *et seq.*

2786. Jacquiot, C. Action du méso-inositol et de l'adénine sur la formation de bourgeons par le tissu cambial d'*Ulmus campestris* cultivé *in vitro*. [**Action of *meso*-inositol and adenine on the formation of buds by cambial tissue of *U. campestris* grown *in vitro*.**] *C.R. Acad. Sci., Paris* 233 (15), 1951 (815–7). 1 ref. [F.f.] O.R.S.

Variations in the proportion of *meso*-inositol and adenine present in the culture medium affected the number of buds formed. In summer an increase in the proportion of adenine to inositol inhibited bud formation; in winter, stimulated it.

2787. BALL, E. **Differentiation in a callus culture of *Sequoia sempervirens*.** *Growth, Philadelphia* 14 (4), 1950 (295–325). 32 refs. L.S.

2788. MEYER, J. Observations sur la succion de la fondatrice d'*Adelges abietis* Kalt. sur *Picea excelsa* L. et la différenciation d'un tissue nourricier primaire par métaplasie. [**Observations on the sucking of the fundatrix of *A. abietis* on *P. abies* and the differentiation of a primary nutritive tissue by metaplasia.**] *C.R. Acad. Sci., Paris* 233 (11), 1951 (631–3). 5 refs. [F.f.] O.R.S.

2789. MEYER, J. Origine maternelle des principaux tissus et du plastème nourricier des galles larvaires d'*Adelges abietis* Kalt. sur *Picea excelsa* Lk. [**Maternal origin of the principal tissues and of the nutritive gall tissues of the larval galls of *A. abietis* on *P. abies*.**] *C.R. Acad. Sci., Paris* 233 (16), 1951 (886–8). 2 refs. [F.f.] O.R.S.

17. SYSTEMATIC BOTANY

172.3. Bacteria

See No. 3094.

172.8. Eumycetes (True Fungi)

See also Nos. 2823–4, 3086 *et seq.*, 3418 *et seq.*

2790. REDMOND, D. R. **Root-inhabiting fungi of Yellow Birch, *Betula lutea* Michx.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (6), 1951 (2).

2791. REDMOND, D. R. **Crown fungi of Yellow and White Birch.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (6), 1951 (2).

Lists fungi discovered in (*a*) live, (*b*) dead tissue in the crowns of Yellow and of White Birch.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

2792. WOOD, G. H. S. **Bark as a means of tree identification.** *J. Oxf. Univ. For. Soc.* (*Ser. 3*) No. 6, 1952 (15–27 + 4 photos). 6 refs.

2793. PRIME, C. T., and DEACOCK, R. J. **Trees and shrubs, their identification in summer or winter.** Heffer & Sons Ltd., Cambridge. 1951. pp. 110 + 7 photos. 21 pp. of drawings. Price 6*s*.

Includes (1) summer key, (2) winter key, (3) descriptive notes, (4) drawings of twigs and foliage, of more than a hundred common British trees and shrubs, both native and introduced.

2794. CLAPHAM, A. R., TUTIN, T. G., and WARBURG, E. F. **Flora of the British Isles.** University Press, Cambridge. 1952. pp. liv + 1591. Price 50*s*.

2795. STEWART, R. R. **Notes on the flora of Kashmir.** *Punjab* (*Pakistan*) *For. Rec.* 1 (2), 1951 (1–13).

2796. CRAIB, W. G., and KERR, A. F. G. **Florae Siamensis enumeratio. A list of the plants known from Siam. Volume III, Part 1. Asclepiadaceae to Convolvulaceae.** The Siam Society, Bangkok. 1951. pp. 100. Price *Bahts*30.

2797. ADAM, J. Noms Toma d'arbres et arbustes (Guinée Française). [**Toma names of trees and shrubs (French Guinea**].] *Comptes rendus, première Conférence internationale des Africanistes de l'Ouest, Paris*, Vol. 2. 1951 (150–2). [F.] Published by the Librairie d'Amérique et d'Orient Adrien-Maisonneuve, 11, rue Saint-Sulpice, Paris 6e. Sponsored by the Institut Français d'Afrique Noire, Dakar. L.S.

An alphabetical list of vernacular names with scientific equivalents.

2798. CHEVALIER, A. Catalogue des arbres vivant dans la forêt dense et les galeries en Afrique centrale (Bassin de l'Oubangui, de la Hte Sangha et du Haut Chari). [**List of the trees of closed forest and forest galleries in central Africa (basin of the Oubangui, the upper Sangha and the upper Chari).**] *Rev. int. Bot. appl. Agric. trop.* 31 (347/348; 349/350), 1951 (485–504; 605–23). [F.] P.R.

Lists, with a brief description, over 250 species, arranged under families.

2799. Flore du Congo Belge et du Ruanda-Urundi. Spermatophytes. Vol. II. [**The flora of the Belgian Congo and of Ruanda-Urundi. Spermatophytes. Vol. II.**] *Publ. Inst. nat. Étude agron. Congo Belge* 1951. pp. iv + 609 + 5 photos + 57 sets of drawings. [F.]

Cf. *For. Abstr.* 11 (No. 985).

2800. TURRILL, W. B., and MILNE-REDHEAD, E. **Flora of tropical East Africa.** [1] Foreword and Preface, [2] Ranunculaceae. Crown Agents for the Colonies, London. 1952 (xxi + 1–23).

2801. LIMA, D. DE A. Lista dos nomes vulgares de espécies do Herbário Pickel. [**List of vernacular names of species in the Pickel herbarium.**] *Bol. Sec. Agric. Ind. Com., Pernambuco* 18 (1/2), 1951 (135–64). [Port.]

Includes a number of tree names with scientific equivalents.

174.2. Gymnosperms

See No. 2783.

176.1. Dicotyledons

See also Nos. 2777–8, 2784, 3491.

2802. JENTYS-SZAFEROWA, J. **Analysis of the collective species *Betula alba* L. on the basis of leaf measurements. Part I. Aim and method of work on the example of *Betula verrucosa* Ehrh. Part II. *Betula pubescens* Ehrh., *B. tortuosa* Ledeb., *B. carpatica* Waldst. et Kit.** *Reprs.* from *Bulletin international de l'Académie polonaise des Sciences et des Lettres, Classe des Sciences mathématiques et naturelles, Kraków* (*Ser. BI*) July/Dec., 1949 (175–213); Jan./March, 1950 (1–63). 33 refs. [E.e.]

A fuller account of the work reported in *For. Abstr.* 13 (No. 106).

2803. JENTYS-SZAFEROWA, J. **Analysis of the collective species *Betula alba* L. on the basis of leaf measurements. Part III. *Betula oycoviensis* Bess., *Betula obscura* Kot. Determination on the basis of one leaf.** *Repr.* from *Bulletin international de l'Académie polonaise des Sciences et des Lettres, Classe des Sciences mathématiques et naturelles, Kraków (Ser. BI)* 1951 (1–40). 8 refs. [E.e.]

In this method, samples are compared by showing graphically, for each of 16 characters of size, shape or feature, the ratio of the arithmetic mean of the investigated sample to the arithmetic mean of another sample which is considered to be a standard of comparison, and which is expressed as a straight line, with a value of 1. The points thus plotted for the characters of the investigated sample are joined, and the angular outline obtained is called the leaf's 'line of shape'. On the basis of samples consisting of 100 leaves from 50 trees and 100 leaves from each of 2 trees of *B. oycoviensis* and of only 50 leaves from 25 trees of *B. obscura*, these two species were studied, using *B. verrucosa* as a standard of comparison. Both appeared to have smaller leaves than *B. verrucosa*; *B. oycoviensis* differed from it considerably and *B. obscura* very little in other leaf characters. In a further investigation the lines of shape of individual leaves of *B. verrucosa*, *B. pubescens*, *B. oycoviensis*, *B. tortuosa*, *B. obscura* and *B. atrata* were studied, using *B. verrucosa* or *B. pubescens* as the standard of comparison. The results show that measurements from a single leaf will in many cases give the characteristic line of shape for the species. The author considers that the line of shape can be used to identify not only taxonomic units within a genus but also larger units.

2804. CHARRIER, G. **I querceti xerofili in un settore delle alpi occidentali italiane. Brevi note di sistematica e fitogeografia con particolare riferimento alla presunta *Quercus toza* Bosc.(= *Q. pedemontana* Colla). [The xerophilous Oakwoods in a sector of the western Italian Alps. Short notes on systematics and phytogeography with special reference to the supposed *Q. toza* Bosc (= *Q. pedemontana* Colla).]** *Nuovo G. bot. ital. (n.s.)* 57 (1/2), 1950 (229–37 + 4 drawings). 9 refs. [It.it.e.] A.P.B.

2805. GILLILAND, H. B. **Notes on Witwatersrand Acacias.** *Trees S. Afr.* 3 (3), 1951 (12–4).

Includes photographs and record of *A. woodii*, not previously recorded in this area.

2806. ROYEN, P. VAN, and STEENIS, C. G. G. J. VAN. ***Eriandra*, a new genus of Polygalaceae from New Guinea.** *J. Arnold Arbor.* 33 (1), 1952 (91–5 + 1 plate). 17 refs.

Eriandra is closely related to *Diclidanthera*, *Moutabea* and *Barnhartia*, 3 genera of the Polygalaceae known only from S. America. A comparison of the genera, which are placed in the tribe Moutabeae, and a key are presented, with a description of *Eriandra* and of the type species *E. fragrans*, a small tree.

2807. MAGUIRE, B. **The genus *Acioa* in America.** *Brittonia, N.Y.* 7 (4), 1951 (271–3).

Includes a key to the species and description of a new tree species, *A. schultesii*.

2808. MCVAUGH, R. **A revision of the North American Black Cherries (*Prunus serotina* Ehrh., and relatives).** *Brittonia, N.Y.* 7 (4), 1951 (279–315).

2809. **The American Poplar, its importance.** *Technical Assistance Mission, O.E.E.C., Paris* No. 13, 1951. pp. 53.

Report of the O.E.E.C. mission to study Poplars in the U.S.A. [Cf. *For. Abstr.* 13 (No. 1920).]

2810. TORTORELLI, L., and CASTIGLIONI, J. A. **Estudio dendrológico de las Estiracáceas argentinas. [Dendrological study of the Argentine Styracaceae.]** *Lilloa* 16, 1948 (125–39 + 4 plates). 13 refs. [Span.e.] A.P.B.

Botanical descriptions and wood anatomy and characteristics of *Styrax leprosus* and *S. subargenteus*.

2811. KOBUSKI, C. E. **Studies in the Theaceae, XXV. The genus *Anneslea*.** *J. Arnold Arbor.* 33 (1), 1952 (79–90).

With descriptions of some new species, varieties and combinations.

18. PLANT ECOLOGY

2812. TSCHERMAK, L. **Pflanzengeographische Grundlagen der Forstwirtschaft in der Türkei. [Plant geography as the basis of Turkish forestry.]** *Z. Weltforstw.* 14 (6), 1951 (171–6). 25 refs. [G.e.f.] Cf. *For. Abstr.* 12 (No. 219); 13 (No. 3509).

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 2863, 2884, 2887.

2813. DECKER, J. P. **Tolerance is a good technical term.** *J. For.* 50 (1), 1952 (40–1). 5 refs.

2814. GRÖHN, W. **Die Graupappel in Schleswig-Holstein. [*Populus canescens* in Schleswig-Holstein.]** *Mitt. dtsch. dendrol. Ges. (Jb. 1950)* No. 56 [1951] (64–6). [G.e.]

General notes, chiefly on silvicultural characters and propagation. Propagation from root suckers is too slow for commercial use; cuttings of ♂ trees—in contrast to those of ♀s—will root only after treatment with growth substances. Grey Poplar has proved a good windbreak tree for farms on land reclaimed from the sea. In mixed windbreaks, where the constant winds kill or seriously impair the growth of some trees of the other species planted (Willow, Ash, Elm, Lime, etc.), root suckers of Grey Poplar not only successfully invade the gaps and stand up to the wind, but also enable the other species to regenerate naturally under their shelter.

181.1. Distribution, Natural Range

2815. KOLAROVIĆ, S. **Nalazišta i stanje Pančićeve omorike u NR Srbiji. [Location and state of *Picea omorika* in Serbia.]** *Šumarstvo* 4 (1), 1951 (27–34 + 3 photos). [Serb.e.]

A detailed list of 21 localities in Serbia where *P. omorika* can be found, with some site and enumeration particulars and a sketch map. Of these localities 14 have been declared reserves. The altitude range is generally 700–1,300 m.; the aspect, from NE to NW. [Cf. *For. Abstr.* 13 (No. 1020).]

2816. MĄDALSKI, J. Jeszcze słów parę o odkryciu *Fagus orientalis* Lipsky na północnej krawędzi Podola. [**A supplementary note on the discovery of *F. orientalis* on the northern border of Podolia.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 7, 1951 (115–22). 13 refs. [Pol.e.]

[A supplement to the author's note in *Sylwan* 56, 1938 (1–5).] Beech specimens discovered by the author are transition forms still belonging to *F. orientalis*. It is suggested that the influence of this species on *F. sylvatica* stands probably began during the postglacial climatic optimum.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 2842, 2852, 2878, 2879, 2885, 2897 *et seq.*

2817. GIACOBBE, A. L'ecologia dell'abete bianco. Nota 4. L'eliofilia nell'Appennino. [**The ecology of *Abies alba*. Note 4. Heliophily in the Apennines.**] *Trav. Lab. for. Toulouse* 1 (5) Art. 3, 1951. pp. 22. Many refs. [It.f.]

The Apennine race of Silver Fir is much more heliophilous than the Central European and forms a link between the latter and the heliophilous and xerophilous Firs of the Mediterranean region. [Cf. *For. Abstr.* 13 (No. 1938).]

2818. VOROPANOV, P. V., and LEUHINA, T. A. Izmenenija vegetativnyh organov eli pod vlijaniem rubok. [**Changes in the vegetative organs of Spruce under the influence of fellings.**] *Lesn. Hoz.* 3 (8), 1950 (34–8). [Russ.]

(1) Measurements were made of the previous year's height growth and of the dimensions of the 'growth cone' (conical shoot apex) in terminal buds of numerous 15- to 65-year-old Spruce trees under varying light conditions (open-grown, thinned, unthinned and understorey) in forests of the Mari A.S.S.R. Results, which are given in tables and diagrams, showed that length of 'growth cone' and amount of height growth were both directly related to the degree of illumination. (2) Shade-grown needles were found to be more flattened in cross-section and had larger cells, with more folded walls, than those receiving adequate light. The assimilating area of needles of the same age on the same tree, increases from the bottom to the top of the crown. Needles of the same age and from the same zone of the crown have an assimilating area that increases with increasing age of tree up to a maximum at 40 years. (3) The chlorophyll content of needles decreased with increasing illumination, being at a minimum in open-grown foliage.

2819. SATO, Y., MIYAKOSHI, M., and MUTO, K. **Factors affecting resistance to cold of tree seedlings. (I) The effect of the length of a period of photoperiodic treatment.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (1), 1951 (63–80). 40 refs. [Jap.e.]

Seedlings of *Picea glehnii, P. abies, Abies sachalinensis, Larix leptolepis, Cryptomeria japonica, Chamaecyparis obtusa, Pinus densiflora, P. thunbergii, Cinnamomum camphora, Paulownia tomentosa*, and *Citrus* spp., were grown for 3 months under natural day-length before they received photoperiodic treatment, with a 10-hr. day, for 10, 20 or 30 days from 15 July to 25 July, 4 August, or 14 August, followed by natural day-length. Controls received no photoperiodic treatment. The osmotic pressures of the treated seedlings were measured and they were then exposed to temperatures of minus 8° C. The following results were obtained: (1) High osmotic pressure was closely related to resistance to cold. (2) A lengthened period of photoperiodic treatment was accompanied by a decrease in height growth and generally by an increase in survival for all species. (3) The period inducing maximum resistance to cold varied from 20 days for *Picea glehnii, P. abies, Abies sachalinensis, Larix leptolepis*, and *Cryptomeria japonica*, to 30 days for *Chamaecyparis obtusa, Pinus densiflora* and *P. thunbergii*. *From authors' summary.*

2820. SATO, Y., and MUTO, K. **Factors affecting the resistance to cold of tree seedlings. (II) The effect of potassium salts.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (1), 1951 (81–96). 25 refs. [Jap.e.]

Seedlings of *Picea jezoensis, P. abies, Abies sachalinensis, Cryptomeria japonica, Chamaecyparis obtusa, Pinus densiflora, P. thunbergii*, and *Cinnamomum camphora*, were grown in nutrient solutions containing different amounts of K. To test the effect of the supply of K at different periods of growth, some seedlings were grown in solutions containing no K, and K was added for 20 days at different stages. After treatment for 2–3 months, the osmotic pressure of the seedlings was measured and they were transplanted into quartz sand and exposed to low temperature. The following results were obtained: (1) All the species except *P. densiflora* showed more resistance to cold with the higher amounts of K in the nutrient solution. (2) *C. japonica* showed more resistance to cold when K was supplied in the early stage of growth, *P. jezoensis, C. obtusa, P. densiflora* and *C. camphora* when it was supplied at the middle stage. (3) High osmotic pressure was related to the supply of large amounts of K. Osmotic pressure was higher in seedlings with K supplied at the middle stage of growth. *From authors' summary.*

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 2723–30, 2738, 2767, 2820, 2830, 2848, 2883, 2889, 3226, 3345.

2821. SATO, Y., and MUTO, K. **Fundamental studies on the nutritional physiology of *Larix kaempferi* and *Thujopsis dolabrata*.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (1), 1951 (1–62 + 8 sets of photos). 34 refs. [Jap.e.]

Seedlings of *L. leptolepis* and *T. dolabrata* were transplanted from the seedbed at respectively 25 and 20 days old, to nutrient solutions, renewed every 5 days, in glazed pots. The seedlings, in groups of 5, were: (1) started in complete nutrient solution, allowed to grow for various lengths of time and transferred to incomplete nutrient solutions (lacking N, P or K); (2) started in incomplete solutions and then transferred to complete solutions; or (3) grown in incomplete solutions throughout the entire period,

except for 20 days, at different periods of growth, when they received the complete solution. Controls were given the complete solution throughout the growing period. The experiment lasted from the date of germination (29 May for *L. leptolepis*, 5 June for *T. dolabrata*) until October. The following results were obtained for *L. leptolepis* (*a*) Seedlings made normal growth when supplied with N for 70 days after transplanting. Those on nutrient solutions lacking N for 20 days after transplanting, were below normal. The seedlings grown in incomplete solutions responded best to the supply of N for the 20 days from 8 to 28 July for height growth, and the 20-day periods from 23 June, 8 July and 23 July for weight growth. (*b*) Seedlings supplied with P for 40 days after transplanting, made normal growth; those deprived of P for 45 days after germination made normal root but poor top growth. Those grown in incomplete solutions responded best to the supply of P from 8 to 28 July. (*c*) Seedlings supplied with K for 40 days after transplanting made normal top growth, but even those supplied with K for 70 days made less root growth than the controls. Absence of K for 45 days after germination did not affect growth. The seedlings in incomplete solutions responded best to the supply of K from 23 July to 12 August. The following results were obtained for *T. dolabrata:* (*a*) Seedlings made normal growth when supplied with N for 40 days after transplanting. Growth was little affected by deprivation of N for 40 days after germination. Seedlings on incomplete solutions responded best to the supply of N during the last 10 days of July. (*b*) Seedling supplied with P for 20 days after transplanting, made normal growth and better growth than those supplied with P for any other 20-day period. Absence of P for 40 days after germination did not affect growth. (*c*) Seedlings made normal weight growth when supplied with K for 20 days after transplanting, but to make normal height growth needed a supply of K for 70 days. Absence of K for 40 days after germination did not affect growth. Seedlings made more weight growth when K was supplied from 25 June to 15 July than for other 20-day periods, and most height growth when K was supplied from 4 to 24 August. The plan of the experiment is drawn in diagrams, and the results presented in graphs, tables and photographs, all with English captions.

2822. LEYTON, L. **The effect of pH and form of nitrogen on the growth of Sitka Spruce seedlings.** *Forestry* 25 (1), 1952 (32–40 + 3 plates). [Department of Forestry, University of Oxford.]

The effect of pH and form of nitrogen (NH_4 and NO_3) on the growth of *Picea sitchensis* seedlings has been investigated in nutrient culture solutions over the range pH 3–7. In both N series the reaction for optimum growth of both shoot and root appears to lie between pH 4 and 5. Above and below this range there is a progressive fall in dry-weight production accompanied by increasingly abnormal root development. The form of N supplied appeared to have little effect on total growth at equivalent reactions, but from the root/shoot ratios it seems that nitrate N stimulates a greater relative root production than does ammonia N. *From author's summary.*

2823. BUCHHOLZ, E. Mykotrophe Ernährung der Bäume (Sammelreferat über neuere sowjetische Forschungen). [**Mycotrophic relationships in tree nutrition. (A review of recent Soviet research.)**] *Z. Weltforstw.* 14 (1/2), 1951 (51–3). 18 refs. [G.]

2824. KALMÁR, Z. Kalapos gombáink (Hymenomycetes) mykorrhiza kapcsolatai. [**The mycorrhizal associations of the hymenomycetes.**] *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (157–87). 68 refs. [Hu.e.russ.]

Discusses literature on mycorrhizal associations and lists (1) Hungarian fungi found with tree species and believed from field observations to form mycorrhizal associations with them; (2) the most important fungi occurring frequently with other plants and possibly in mycorrhizal association with them; and (3) the most important saprophytic fungi. *From author's summary.*

2825. HACSKAYLO, E. **A study of the roots of *Pinus virginiana* in relation to certain Hymenomycetes suspected of being mycorrhizal.** *J. Wash. Acad. Sci.* 41 (12), 1951 (399–400). 5 refs. A.P.B.

Young *P. virginiana* seedlings were inoculated with cultures of several Hymenomycetes collected in a Pine stand near Washington, D.C. After about 2 months, dichotomous branching developed in roots inoculated with *Amanita verna*, and to a lesser extent in those inoculated with *Lactarius piperatus* and *Tricholoma portentosum*. Initials of ectotrophic mycorrhizae were also detected. After a period of 6 months, however, the growth and development of the mycorrhizae had not been maintained.

2826. MILANEZ, F. R., and NETO, H. MONTEIRO. Nota prévia sôbre a micorriza do Pinho do Paraná. [**Preliminary note on the mycorrhiza of *Araucaria angustifolia*.**] *Repr.* from *Arq. Serv. flor., Brasil* 4, 1950 (87–93 + 3 plates). 12 refs. [Port.e.]

Short, nearly spherical rootlets on *Araucaria angustifolia* were found to have the cortical cells filled with mycorrhizal hyphae. Results of a study of the rootlets and fungus are presented, and the importance of the mycorrhizae in the growth of *A. angustifolia* is discussed.

2827. DOMINIK, T. Modrzew w lasach czerniejewskich pod Gnieznem i dynamika rozwojowa jego mykorhizy. [**Larch in the forests of Czerniejewo near Gniezno and the development of its mycorrhizae.**] *Acta Soc. Bot. Polon.* 20 (1), 1949–50 [1950], (305–30). 13 refs. [Pol.f.] C.G.B.

The trees examined were all *L. polonica* except for one hybrid *L. polonica* × *L. leptolepis*. They are recommended for lowland sites, since they grow well at Czerniejewo in a depression where there is often stagnant water for several weeks in the spring, and they are not attacked by *Dasyscypha willkommii*. On this site they all show typical ectotrophic mycorrhizae. The inoculation of nursery sites by adding soil from the A horizon from under affected trees is recommended, and the establishment of a new Larch nursery by transplanting a number of plants with soil round their roots from the

Czerniejewo nursery. The anatomy and development of mycorrhizae of Larch is discussed, with illustrations.

2828. DOMINIK, T. Badania mykotrofizmu dzikich grusz na terenie Polski z uwzględnieniem warunków bioekologicznych. [**Research on the mycotrophy of wild Pears in Poland, with reference to ecological conditions.**] *Acta Soc. Bot. Polon.* 20 (1), 1949–50 [1950], (255–303). 43 refs. [Pol.f.] C.G.B.

Mycorrhizae on wild Pears from different parts of Poland were studied. Ectotrophic mycorrhizae were present in 19% and endotrophic in 81% of the specimens examined. Tolypophagous mycorrhizae formed 83·9% of those examined. The largest, oldest and most fruitful trees were found on agricultural soils in association with tolypophagous endotrophic mycorrhizae. Ectotrophic mycorrhizae were found in trees on forest land or land that had been uncultivated for a considerable time. It is recommended that for a given soil, nurseries should be set up round some of the best trees and that when young trees are needed, e.g. for shelterbelts in agricultural land, they should be planted at fairly wide spacing with a good deal of the original soil left round their roots, and that wild Pears should be sown in between. [Cf. *For. Abstr.* 13 (No. 1031).] *From author's summary.*

2829. UEMURA, S. **Studies on the root nodules of Alders (*Alnus* spp.). (1) Review of literature on the root nodules of Alders.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 49, 1951 (1–10). 64 refs. [Jap.e.]

181.4. Reaction to Biotic Influences and Fire

See also Nos. 2838, 2844, 2885, 3056, 3061, 3066, 3069–70.

2830. BROOKS, M. G. **Effects of Black Walnut trees and their products on other vegetation.** *Bull. W. Va. agric. Exp. Sta.* No. 347, 1951. pp. 31. 16 refs.

A study was made of vegetation under 300 Black Walnut (*Juglans nigra*) trees. Tables are given showing frequency both within and without the root-spread of Walnut trees, of 60 tree species, 35 shrubs and climbers, and 123 herbaceous plants. Observations are given on apparent antagonisms between Black Walnuts and apples, potatoes, tomatoes, alfalfa, blackberry, heaths and other plants. The evidence indicates that actual contact with Walnut roots is necessary before other plants are harmed. Black Walnuts have been shown to benefit pastures by encouraging the growth of Kentucky bluegrass (*Poa pratensis*) and other cultivated grasses. [Cf. *For. Abstr.* 11 (No. 3260).]

2831. LUTZ, H. L. **Ecological effects of forest fires in the interior of Alaska.** *Bulletin of the National Research Council, Washington* No. 122, 1951 (120). O.R.S.

Conclusions from a preliminary analysis of field data from a study lasting 2 summers, include the following: (1) Light surface fires in climax stands of White Spruce on moderately deep mineral soils do not usually cause a radical change in forest composition, but the proportion of Aspen, Birch and Balsam Poplar is somewhat increased and that of Spruce reduced. (2) Single severe fires in climax stands on moderately deep mineral soils usually result in replacement of Spruce by Aspen, Birch or Balsam Poplar, pure or in mixture. (3) When Black Spruce stands are destroyed by fire, the areas usually regenerate with the same species. (4) Repeated severe fires may lead to conversion from forest to treeless areas, and recovery may be extremely slow, especially on poorer soils. (5) A period of 100–200 years may elapse after destruction by fire, before Spruce of sizes suitable for sawtimber or building timber is again available. (6) Many Alaskan soils are shallow and become highly erodible when the vegetation has been destroyed.

181.5. Reproductive Behaviour

See also Nos. 2768–9, 2872 *et seq.*, 2896, 2908 *et seq.*, 2956, 3192.

2832. GODNEV, E. D. Sposobnostj sosny obyknovennoĭ k vosstanovleniju stvolovoĭ časti. [**Ability of Scots Pine to regenerate stem parts vegetatively.**] *Lesn. Hoz.* 3 (9), 1950 (53–5). [Russ.]

Briefly describes the occurrence of dieback—attributed to disharmony between crown and root growth—in Scots Pine plantations at the polewood stage in the Buzuluk forest, and the subsequent recovery of practically all the trees after a lapse of 16–17 years as a result of lateral branches replacing the leaders. Mentions also cases of the replacement of lost leaders in young plants by shoots from dormant buds, in confirmation of other reports [cf. *For. Abstr.* 13 (No. 1957)], and a case in which coppice growth appeared from stumps of 10-year-old trees in a very wet summer, and persisted on some of the stumps for ca. 9 years, though all died by the end of that period.

2833. ŠPIRANEC, M. Još o početnoj fiziološkoj zrelosti šumskog drveća. [**More on the initial physiological maturity of forest trees.**] *Šum. List* 75 (6), 1951 (213–21). 19 refs. [Croat.g.]

Reviewing local and European findings on the subject (14 Jugoslav references are cited) the author observes that data for one country are inapplicable to another having different climatic and edaphic conditions. In general, warmer climates hasten the onset of seed-bearing, but the effect of soil is not yet clear; and while physiological maturity coincides with the period of maximum (height or volume) increment, the relationship is not yet firmly established. As regards the species dominant in the coppice and thickets that form ca. 40% of Jugoslav forests, Chestnut coppice [*Castanea sativa*] begins to bear seed after 4–6 years, whereas Ettinger (1893) gave 25 years for well developed trees, and German sources 40–50 years. Similarly, Oak begins seed-bearing after 70–80 years according to German sources and 60–100 years according to French; Ettinger gives 55 years (applicable for central Croatia and Serbia), while the author's own experience is that seedling Oak (*Q. robur* and *Q. sessiliflora*) in lowland and upland forests (100–300 m. alt.) of the Zagreb and Bjelovar districts, on soils of 1st and 2nd quality, start seed-bearing after

30–35 years, and coppice Oak after 15–18 years. [Cf. *For. Abstr.* 13 (No. 144).]

2834. ALBO, G. La riproduzione e la ripartizione dei sessi nella *Ceratonia siliqua* L. **[Reproduction and the distribution of the sexes in *C. siliqua*.]** *Nuovo G. bot. ital.* (*n.s.*) 58 (1), 1951 (60–72 + 5 photos). 25 refs. [It.it.e.] A.P.B.

2835. BUGAŁA, W. Określanie płci u topoli na podstawie zabarwienia liści. **[Sex determination of Poplars from the colour of the leaves.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 7, 1951 (195–7). 2 refs. [Pol.]

The author found that ♂ Poplars (e.g. *P. serotina*) have dark-green leaves with reddish petioles and main nerves, and reddish young shoots, while ♀ Poplars (e.g., *P. marilandica*) have bright-green foliage, and no red coloration in petioles and nerves. The difference in the colour of foliage is most pronounced in Black Poplars (*Aigeiros*); it is less so with Balsam Poplars (*Tacahamaca*) and those of the section *Leucoides*; and almost disappears in White Poplars (*Albidae*) and Aspens (*Trepidae*).

2836. RAY, P. K. **Gregarious flowering of common hill Bamboo, *Arundinaria maling*, Gamble.** *Indian For.* 78 (2), 1952 (89–91 + page of drawings). 3 refs.

Gregarious flowering of this species, not previously recorded, occurred in the Darjeeling hills in 1951. The morphology of flower and fruit is described and illustrated.

2837. MATHAUDA, G. S. **Flowering habits of the Bamboo—*Dendrocalamus strictus*.** *Indian For.* 78 (2), 1952 (86–8 + 3 photos). 2 refs.

As a result of observations in Bamboo forests in U.P., Orissa, Punjab and Madhya Pradesh, the author reaches the following conclusions. The periodicity of gregarious flowering of *D. strictus*, in some localities, is more than 65 years and may possibly exceed 100 years. Sporadic flowering is very irregular, varying in intensity from place to place, and from year to year in the same locality. Portions of the same clump may flower in successive years. Flowering culms may be of any age and are not necessarily the oldest in the clump. Normally culms die after flowering, though some flower for two successive years.

2838. [COOPER, R. W.] **Regenerating the 'Big Scrub'.** *Sth. Lumberm.* 183 (2297), 1951 (175).

Research by the Southeastern Forest Experiment Station has shown that reasons for poor regeneration of Sand Pine [*P. clausa*] in the Ocala National Forest, Florida, are that: (1) Most of the seed is retained on the tree in persistent cones which do not open without a killing fire [cf. *For. Abstr.* 13 (No. 153)]. (2) Ants and rodents consume a large part of the seedfall. (3) Soil surface temperatures exceeding 140° F. on clear days during the growing season, usually kill germinating seeds in unshaded places.

2839. LYON, N. F. **Seed dispersal test.** *Progr. Rep. Field Lab. Proj. Ont. Dep. Lds. For. 1950/51*, 1951 (75–6).

Seed traps were set round two trees of *Pinus strobus*. Seed was dispersed at a rate of 2,000/acre from one and 3,652/acre from the other. Seed can travel at least 200 ft. from the parent tree. Dispersal lasted from 3 to 30 Oct.

2840. TURČEK, F. J. O vzt'ahu sojky (*Garrulus glandarius* L.) k obnove dubu (*Quercus* sp.). **[The role of the jay in the regeneration of Oak.]** *Lesn. Práce* 29 (9/12), 1950 (385–96). 18 refs. [Slovak. slovak.russ.e.]

The relationship between *G. glandarius* and Oak is illustrated by a map showing the distribution of both in the Eastern Hemisphere. In Slovakia, jays begin to feed on acorns in August, when they leave the conifer forest and tend to concentrate near Oak trees or stands. Acorns that cannot be consumed at once are carried by the jay either singly in the beak or several at a time in the crop, and hidden. This accounts for the role played by the jay in the regeneration of Oak, particularly in what is called up-hill planting. In the level plains of western Slovakia, among even-aged monocultures of Pine single Oak trees upward of 100 years old are found, forming ca. 0·1–0·2% of the number of stems. Owing to the unceasing activity of jays, a second Oak storey, aged 1 to 25, has been formed in these stands. The jays, it is calculated, are responsible for having planted Oak in 42% of the whole area of Pine forests. [Cf. *For. Abstr.* 11 (No. 2647).]

2841. LARUE, C. D., and MUZIK, T. J. **Does the Mangrove really plant its seedlings?** *Science* 114 (2973), 1951 (661–2). 2 refs.

Counts were made of straight seedlings of *Rhizophora mangle* that had planted themselves in the mud and of those that had fallen flat in the mud and then bent so as to bring the stem tip into a vertical position [cf. *For. Abstr.* 11 (No. 886)]. The % planted vertically in the mud was high (94–95%) in 3 areas of typical Mangrove swamp examined. Seedlings were dropped from heights of 1 and 2 m. to discover the depth of planting. Average results varied from 3·8 to 5·2 cm. Naturally planted seedlings were pulled up and examined; the average penetration into the mud was 4·0 cm. Seedlings planted naturally in the mud showed earlier emergence of lateral roots than those that fell flat on the mud, and remained plump and healthy, while those that fell flat appeared withered and battered until they had developed roots and curved up to the vertical. Results are tabulated.

2842. KUSAKA, M., and MIDORIKAWA, T. **A model V-shaped seedbed with graduated shade.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (111–2). [Jap.e.]

As, in nature, Akamatsu [*Pinus densiflora*] naturally regenerates towards the top of the slope, while Sugi [*Cryptomeria japonica*] regeneration is found near the foot, the author designed a test seed bed having both N. and S. slopes and overhead screen giving graduated shade (illustrated).

Preliminary results (2 years) of mixed broadcast sowings were: (1) at a light intensity of 34% Larch [*Larix leptolepis*] and Akamatsu grew along the top of the slope at each side, and Sugi along the foot; (2) at an intensity of 73% Pine was dominant on the slope facing south and Larch on that facing north. Some improvements are proposed in the design, for further experiments.

2843. HOSOI, M., MATSUMOTO, M., and MANABE, T. **The causes and season of mortality among young Red Pines.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (103–5). [Jap.e.]

The number of seedlings of Red Pine [*P. densiflora*] and the causes of their mortality during the first year after germination were examined. Between 80 and 90% of the seeds were eaten by birds before germination; damage by birds after germination is also high. Germination took place mostly in the late June rains, and there was a maximum number of young plants in early July. Mortality was highest immediately after germination and after the rainy season. Between spring and autumn, mortality was 80% of the total number of young plants. There was considerable damage from run-off and soil accumulation. Germination was higher on the forest margins. *From authors' summary.*

2844. HUNZIKER, T. Zum Einfluss der Bodenflora auf die natürliche Föhrenverjüngung. [**The influence of the ground flora on natural regeneration of Scots Pine.**] *Schweiz. Z. Forstw.* 103 (1/2), 1952 (47–8). [G.]

Gives the results of a laboratory experiment started in 1949 with Pine of two provenances on 4 types of seedbed: bare earth and sod from the *Molinia*/Pine type (*a*); bare earth and moss carpet from the Oak/Hornbeam type (*b*). For the same soil and provenance, germination % was higher on bare than on covered ground: 75·3 and 22·6% respectively for (*b*) and 51·1 and 43% for (*a*). The maximum number of seedlings was obtained from early sowings (24 March) after an average of 8 weeks, and from late sowings (11 May) after an average of ·3 weeks; type of ground cover did not affect this result. By the end of the first growing season (Nov. 1949) all seedlings had disappeared from the *Molinia*-covered (*a*), there was a good catch of seedlings on the bare (*b*), while the bare (*a*) and moss-covered (*b*) gave variable results. Height of seedlings was measured in March 1951 for one provenance on (*b*) and was found to be 5·5 ± 0·13 cm. on bare and 8·7 ± 0·31 cm. on moss-covered soil. It is concluded that soil scarification would facilitate natural regeneration of Pine on types (*a*) and (*b*).

2845. RALSTON, R. A. **Is the growth of Jack Pine reproduction affected by age of parent tree?** *Tech. Note Lake St. For. Exp. Sta.* No. 368, 1952. p. 1.

Height and d.b.h. measurements of 50 sample trees from each of 7 age classes of parent trees, after 14 growing seasons from seed, indicate that there is no difference once the seedlings are firmly established.

181.6. Life Form, Habit. Post-Seedling Development and Form. Crown Form and Crown Relations

See also Nos. 2818, 2832, 2989, 2996, 3230.

2846. GUTTENBERG, S. **Listen to the bark.** *Sth. Lumberm.* 183 (2297), 1951 (220–2).

Discusses, with photographs, the relationship of vigour classes and rate of growth to bark and crown characteristics for Oak species and Sweetgum. [Cf. *For. Abstr.* 13 (No. 3254).]

2847. BROWN, J. M. B. **Notes on Chiltern Beechwoods.** *Quart. J. For.* 46 (1), 1952 (5–15). 6 refs.

Attempts to indicate some of the basic reasons for the wide differences in the performance of Beech in different parts of the Chilterns, and emphasizes how site, soil, and treatment affect the aims of management.

2848. DOSEN, R. C., PETERSON, S. F., and PRONIN, D. T. **Effect of ground water on the growth of Red Pine and White Pine in central Wisconsin.** *Transactions, Wisconsin Academy of Sciences, Arts and Letters, Madison* 40 (1), 1950 (79–82). K.

The results of a mensurational analysis of a mixed stand of Red and White Pine established in 1930 by planting 2-year-old seedlings on the depleted sandy soil of the shore of the artificial Nepco Lake, and of a chemical analysis of the soil top layers at various levels above the lake and of well water and ground water under-lying the plantation. Trees growing at a level of ca. 50 in. above the lake now show more than double the height growth and nearly double the diameter growth of trees on drained uplands (ca. 200 in. above lake level).

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour

See Nos. 2833, 2845, 2945.

181.8. Phenology

See also Nos. 2762, 2836–7, 2901, 2946–7, 3303.

2849. LEIBUNDGUT, H., and KUNZ, R. Zur Phänologie der Laubbäume, insbesondere der Buche. [**The phenology of broadleaved trees, particularly of Beech.**] *Schweiz. Z. Forstw.* 103 (1/2), 1952 (29–46). 26 refs. [G.g.f.]

A review of the literature and their own observations led the authors to the conclusion that variation between individuals in date of flushing is a regular phenomenon, and that it is a heritable character. Observations made on sample plots on 19 April 1949 showed that 63% of the dominated and suppressed trees but only 10% of the dominants and co-dominants were then in full leaf, which confirmed the opinion that the lower crown classes are usually earlier in flushing. In the Beech stands studied there was no evidence of any correlation between date of flushing and stem quality. The best formed dominant trees were divided almost equally between early and late flushing.

2850. RODENWALDT, U. Die spättreibende Buche. [**Late-flushing Beech.**] *Forstwiss. Cbl.* 68 (3), 1949 (151–61). 8 refs. [G.g.]

Theories on late flushing are discussed, and evidence is quoted to show that this is an inherited characteristic. Preliminary observations during the abnormally warm springs of 1947–8 suggest that strains exist which in normal years will flush only after the last frosts. [Cf. *For. Abstr.* 13 (No. 225).]

2851. BELYEA, R. M., FRASER, D. A., and ROSE, A. H. **Seasonal growth of some trees in Ontario.** *For. Chron.* 27 (4), 1951 (300–5). 13 refs.

Studies on seasonal growth of forest trees in Ontario have been in progress during the past 5 years

as part of the research programme of the Forest Insect Laboratory, Sault St. Marie. This paper describes a new dial-gauge dendrometer developed at the laboratory and its use in these studies. Preliminary data on the general course of seasonal development is given for the principal species of the region—*Abies balsamea, Acer saccharum, Betula lutea, B. papyrifera, Fagus grandifolia, Fraxinus nigra, Larix laricina, Picea glauca, P. mariana, Pinus banksiana, P. strobus, Populus tremuloides, Tilia americana* and *Tsuga canadensis*.

2852. PAOLIS, D. DE. Considerazioni sulla variabilità della cerchia legnosa del mandorla. La luce è un fattore importante? [**Variability of the growth rings of the Almond. Is light an important factor?**] *Nuovo G. bot. ital.* (*n.s.*) 57 (1/2), 1950 (210–22). 3 refs. [It.it.e.] A.P.B.

Almond trees in Apulia showed abnormal growth rings in 1948. Formation of early wood continued to the end of May, whereas in normal years the cambium has begun to differentiate intermediate wood by the beginning of May. The month of May was abnormally sunless in that year and it is suggested that light may be a limiting factor to cambial activity in a normally sunny region such as Apulia. [Cf. *For. Abstr.* 11 (No. 201).]

182. *Synecology, Plant Sociology: General, Principles and Methods*

2853. DREES, E. M. **Capita selecta from modern plant sociology and a design for rules of phytosociological nomenclature.** *Rapp. Bosbouwproefsta., Bogor* No. 52, 1951. pp. 68. 12 refs. [E.]

A summarized translation of *Rapp. Bosbouwproefsta., Bogor* No. 51, containing the following sections: general remarks on the classification of the study of plant communities; the problem of the characteristic species in the associations; variability within associations; classification of associations; and the 100 rules of nomenclature in floristic phytosociology. [Cf. *For. Abstr.* 13 (No. 1962).]

182.1. Palaeoecology. History of Vegetation

2854. GODWIN, H., and TALLANTIRE, P. A. **Studies in the post-glacial history of British vegetation XII. Hockham Mere.** *J. Ecol.* 39 (2), 1951 (285–307). 20 refs.

Pollen analysis shows that after a period of dense forest growth through Boreal and early-Atlantic times, some clearance took place (represented by a sharp rise in several categories of non-tree pollen), which is attributed to clearance by Neolithic man. The deforestation was accentuated at a later time which cannot be certainly identified. These effects appear to demonstrate the anthropogenic and prehistoric origin of the great Breckland heaths. [Cf. *For. Abstr.* 6 (70).] *From authors' summary.*

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 2729, 2831, 3521.

2855. LOTTI, T., and MCCULLEY, R. D. **Loblolly Pine: maintaining this species in the southeastern United States.** *Unasylva* 5 (3), 1951 (107–13). 10 refs.

The authors hold that *Pinus taeda*, the dominant species over much of the south-eastern U.S., is only a subclimax, and they discuss silvicultural methods of maintaining it against the natural succession to mixed hardwoods.

2856. VE, S. Stig skoggrensa? [**Is the timberline rising?**] *Tidsskr. Skogbr.* 59 (9), 1951 (305–17). 8 refs. [Nor.]

Concludes from answers to questionnaires sent to farmers and foresters in 1923 and in the 1930's, and from a study of different districts in N. and S. Norway, that the timberline has risen during the century, as a result of reduced damage to forest by grazing, of better forestry and of improved climate. It is difficult to obtain evidence of any effect of increased temperature alone. Details of the limits of Birch in different districts of Troms and Norrland and of Pine in Troms are tabulated.

187. *Vegetation Types*

See also Nos. 2728–9, 2737, 2741, 2804, 2831, 3135, 3522.

2857. GIACOBBE, A. Le base concrete per una classificazione ecologica della vegetazione italiana. [**Bases for an ecological classification of Italian vegetation.**] *Archivio botanico, Forlì* 24 (1; 2; 3/4), 1948 (21–54; 89–106; 236–62 + 1 dgm.); 25 (1; 2; 3/4), 1949 (1–31; 65–82; 129–264 + 5 dgms. + 1 map). [It.] K.

Cf. *For. Abstr.* 12 (No. 1801).

2858. MAEDA, T. **Sociological study on forests of *Chamaecyparis obtusa* and their Japan-Sea elements.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (21–44 + 12 photos). 31 refs. [Jap.e.]

In the natural stands of *C. obtusa*, 8 species are classed as Japan-Sea elements, 9 as Pacific, and 8 as common to both. Sub-associations and sociations are discussed. *C. obtusa* forests occur where monthly winter rainfall is over 100 mm. and on podzol soils. *From author's summary.*

2859. SAID, M. **Ecology of Salt Range forests.** *Pakistan J. For.* 1 (4), 1951 (310–23 + 3 photos).

The effects of biotic interference, soil and aspect on the vegetation of the arid, limestone Salt Range forest are considered, and the scrub forests of the region are classified into 5 local types. Champion has classified these forests as a seral type of the Northern Thorn forest, in which succession has been halted by external interference. The present author considers that the forest is climax under existing conditions and that *Dodonea viscosa* marks a transitional stage between *Acacia modesta* and *Olea cuspidata* in the succession. Lists of woody species, herbs and grasses are given.

2860. HOLMES, C. H. **The grass, fern, and savannah lands of Ceylon, their nature and ecological significance.** *Inst. Pap. imp. For. Inst., Oxf.* No. 28, 1951. pp. 95 + 29 photos + 1 dgm. + 1 map. 42 refs. Price 20*s*.

The non-forest types of Ceylon are classified as: (1) *talawa* grasslands, and (2) *kekilla* fernlands (both in the wet low country below 1500 ft.); (3) dry *patana* grasslands, and (4) open savanna forest (both in wet mid-country at 1500–5000 ft.); (5) wet black

patana in the wet hill country above 5000 ft.; (6) dry *damana* grasslands, and (7) wet *villu* grasslands (both in the dry low country below 1000 ft.). The distribution of these formations is described and the soils and climate of the regions in which each is found are examined. It is concluded that the climax vegetation in (1)–(4) is closed forest of the tropical wet evergreen type, in (5) subtropical wet montane forest, and in (6)–(7) tropical dry mixed evergreen forest. The structure and floristic composition of each of these climax types and of the grass, fern, or savanna lands associated with them, are described in detail. It is concluded that all these non-forest types are secondary and of biotic origin, arising from clearing, burning and cultivation and, after abandonment, by periodic burning [cf. *For. Abstr.* 13 (No. 1054)]. The botanical appendix lists all species mentioned in the text, arranged by families under the communities in which they characteristically occur.

2861. McINTOSH, R. P. **Pine stands in south-western Wisconsin.** *Transactions, Wisconsin Academy of Sciences, Arts and Letters, Madison* 40 (2), 1951 (243–57 + 2 photos). 20 refs. K.

A study of the flora and site factors of many areas of south-western Wisconsin and adjacent north-western Illinois, where Pine trees are a conspicuous, sometimes predominant, element of vegetation, suggests that these are relict stands of the general southward extension of the northern coniferous forest in glacial times.

2862. BARRETO, H. L. DE MELLO. Regiões fitogeográficas de Minas Gerais. [**Vegetation zones of Minas Gerais.**] *An. bras. Econ. flor., Inst. nac. Pinho* 2 (2), 1949 (352–69). 26 refs. [Port.e.]

Five of the botanical zones, as defined by A. J. de Sampaio are represented in the vegetation of Minas Gerais State, viz. campos (open grassland), caatingas (thorny shrub), cocais (Coconut), matas costerias (coastal forests), and pinhais (Pine forests). Descriptions of the zones are presented.

2863. HUECK, K. Die Wälder und die waldbaulichen Verhältnisse in Nordwestargentinien. II Der Anden-Erlenwald (das *Alnetum jorullense*) in der Provinz Tucuman. [**Forests and silviculture in north-western Argentina. II. The Andean Alder forests (*Alnetum jorullense*) in Tucuman province.**] *Forstwiss. Cbl.* 70 (11), 1951 (666–76). 6 refs. [G.]

An extract from a more comprehensive monograph to appear in *Lilloa.*

2864. SKOTTSBERG, C. Apuntes sobre la flora y vegetación de Frai Jorge (Coquimbo, Chile). [**The flora and vegetation of Frai Jorge (Coquimbo, Chile).**] *Meddelanden från Göteborgs Botaniska Trädgård, Göteborg* 18, 1948 (91–184 + 20 plates). Numerous refs. [Span.] L.S.

A study of climate, plant associations, and geographical distribution of individual species, with a catalogue of plants collected in this area.

2865. PAPY, H. R. Comparaison de la végétation des hauts sommets de Tahiti et du plateau Temehani à Raiatea (Océanie Française). [**Comparison of the vegetation of the high summits in Tahiti and of the Temehani plateau, Raiatea, French Oceania.**] *Trav. Lab. for. Toulouse* 5 (1) Art. 2, 1950. pp. 6. 11 refs.

Cf. *For. Abstr.* 12 (No. 178).

2. SILVICULTURE

See also Nos. 2855, 2863.

2866. SCHWEND, C. Beiträge zu forstlichen Fragen des oberschwäbischen Altdiluvialgebietes. [**Forestry problems in the old diluvial region of Upper Swabia.**] *Forstwiss. Cbl.* 68 (4), 1949 (220–39). 2 refs. [G.]

Discusses the geology and topography of the area, the choice of species for mixed forest on different sites, and measures needed to ensure natural regeneration of Spruce on raw-humus soils, or to prepare the soil for planting mixed species instead of Spruce.

2867. FOURY, P. Programme d'action forestière en A.O.F. (principes de sylviculture tropicale). [**Silvicultural programme for French West Africa (principles of tropical silviculture).**] *Comptes rendus, première Conférence internationale des Africanistes de l'Ouest, Paris,* Vol. 2, 1951 (3–10). [F.] Published by the Librarie d'Amerique et d'Orient Adrien-Maisonneuve, 11, rue Saint-Sulpice, Paris, 6e. Sponsored by the Institut Français d'Afrique Noire, Dakar. L.S.

Discusses principles suitable to tropical regions in general and to French West Africa in particular, i.e. methods of managing savanna and high forest and of exploiting timber and minor forest products.

2868. Le châtaignier et sa culture de rapport. [**The Chestnut and its cultivation for profit.**] *Bull. tech. Châtaignier Éc. Eaux For. Nancy,* No. 1 (3rd ed.), 1949. pp. 78. 18 refs. [F.]

Cf. *For. Abstr.* 13 (No. 3538).

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

2869. TROUP, R. S., revised by JONES, E. W. **Silvicultural systems.** Clarendon Press, Oxford. 2nd ed., 1952. pp. xv + 216 + 65 photos. Price 25*s.*

In addition to many slight alterations throughout the book, the chapter on the selection system has been largely rewritten, and a 15-page chapter added on the developments of the last 20 years.

221. *High Forest Systems*

See also Nos. 2727, 2873, 2994, 3229, 3253.

2870. KUNUGI, R. [**A report on**] **growth on the Chuoo-zan experimental plot of Tokyo University Forest, Hokkaido under the selection system.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (13–20). [Jap.e.]

Results of measurements between 1933 and 1949 on areas subjected to fellings removing 20% and 40% by volume over 3 cm. d.b.h., showed that the 20% removed was made up in ca. 8 years and the 40% in ca. 20 years. Felling damage and decay was higher in the 40% area, but after 11 years, decay in the 20% area exceeded the 40%, and after another 5 years it had reached the same level.

222. *Coppice, Pollarding and Lopping Systems*

See also No. 2875.

2871. BERNARDINI, F. I cedui di castagno nell'economia forestale italiana. [**Chestnut coppice in the forest economy of Italy.**] *Monti e Boschi* 3 (1), 1952 (8–18). [It.f.e.]

Gives figures to show that wood production by Chestnut coppice is much greater (10 times in southern Italy) than that of Chestnut high forest.

228. *Constitution and Composition of Stands; Forms of Stand. Tree Classes*

See No. 2846.

23. REGENERATION AND FORMATION OF STANDS

231. *Natural Regeneration*

See also Nos. 2838–45, 2955, 3001, 3006, 3066.

2872. ŠIMANJUK, A. P. Zaselenie sosnoĭ i eljju byvšyh pahotnyh zemelj. [**Colonization of old arable land by Pine and Spruce.**] *Lesn. Hoz.* 3 (9), 1950 (50–2). [Russ.]

Gives for one area in Ivanov and two areas in Vologda, some figures showing the number of seedlings at various distances from the seed source (forest edge). Concludes that under optimum conditions, including soil preparation, natural regeneration may be adequate over a 500-m. cleared strip between two blocks of seedbearing forest; any strip exceeding this width will be inadequately stocked in the middle.

2873. SSORIN, V. A. Lesovozobnovlenie v pihtovyh lesah verhneĭ Svanetii. [[**Natural**] **regeneration in the *Abies nordmanniana* forests of Upper Swanetia [Caucasia].**] *Lesn. Hoz.* 3 (9), 1950 (42–5). [Russ.]

These forests occupy mountainous country, mostly on steep slopes with shallow soils, intersected by many deep ravines. The best growth conditions are found between 1000 and 1800 m., where volumes per ha. run at 600–800 (sometimes up to 1200) cu.m. Overmature stands prevail, 200–400 or more years old, generally with Fir in the upper storey and an understorey of Beech [*Fagus orientalis*?], Fir, and Spruce [*Picea orientalis*?]. Natural regeneration varies with forest type in both amount and composition, though the Fir always predominates. Within each type, its occurrence is related to density of canopy, herbaceous growth and underwood. In the past, fellings have usually been selective, unregulated, and confined to the more accessible areas. Much damage to advance growth has resulted, especially as trees have generally been felled downhill, when the stems may slide for 80–100 m. before coming to rest. Where clear or almost clear felling has occurred, the felled areas are usually invaded by brambles, which seriously impede regeneration. The best regeneration is found on areas where selective felling has reduced the stand volume by not more than 50–60% and the density of canopy in the first and second storeys respectively to 0·1–0·2 and 0·3–0·4, with more or less uniform opening of the canopy. Such fellings leave enough old growth for soil protection and 60–70% of the advance growth is undamaged. Heavier fellings involve danger of erosion and inadequate regeneration, one factor probably contributing to the latter being the damage to exposed seedlings by spring and autumn frosts.

2874. VINCENT, A. B. **Experimental cutting in mixedwood stands, Green River, New Brunswick.** *Silv. Leafl. For. Br. Can.* No. 58, 1951. pp. 4.

Experiments were made with different methods of cutting, in order to determine the best way of ensuring regeneration of Spruce (*Picea glauca*) and Balsam Fir (*Abies balsamea*) when these species are cut for pulpwood in a mixed Spruce/Balsam/hardwood stand. Results, 10 to 12 years later, were complicated by dieback of Yellow Birch, but it is concluded that spring cutting has no advantage over summer cutting; that no increase in regeneration resulted from leaving 2 seed trees of Spruce per acre; that girdling defective, overmature hardwoods at the time of the pulpwood cutting favoured the establishment of coniferous advance growth and subsequent reproduction; and that all regeneration was favoured by tractor skidding in comparison with horse-skidding of tree-length logs or cutting at stump.

2875. OKADA, T. **Studies on the early growth of Abemaki (*Quercus variabilis* Bl.) coppice.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (99–101) . [Jap.e.]

Sections of a 35-year forest were coppiced in October, December or March. In the 2nd year, approximately equal numbers of coppice shoots were cut out on each section. The following results were obtained: (1) After 10 years, diameter, height, and average volume were best on the section coppiced in December. (2) Stump survival was also best in this section. It is concluded from these results that, other things being equal, coppicing in December gives the best and in October the worst results. *From author's summary.*

232. *Artificial Regeneration*

2876. WAKELEY, P. C. **Planting the Southern Pines.** *Occ. Pap. Sth. For. Exp. Sta.* No. 122 (3 vols.), 1951. pp. 579. Many refs.

A preliminary limited edition of a manuscript intended for publication later as a bulletin of the U.S. Department of Agriculture. It contains sections on: planting policies (including choice of species, seed provenance, spacing, costs and yields); seed; nursery practice; planting; and plantation care.

2877. **Os serviços de reflorestamento do I.N.P. [The reforestation service of the National Pine Institute.]** *An. bras. Econ. flor., Inst. nac. Pinho* 2 (2), 1949 (403–11). [Port.e.]

A summary of work achieved in reforestation with *Araucaria angustifolia* by the 8 stations of the Instituto Nacional do Pinho. Till now, direct sowings have predominated, but studies of planting methods and spacing are in progress.

2878. GUTIERREZ JARQUIN, T., and MARTINEZ GARCIA, J. Notas sobre trabajos de repoblación artificial de caoba y cedro en el estado de Campeche. [**Notes on artificial regeneration of *Swietenia macrophylla* and *Cedrela mexicana* in the state of Campeche.**] *Boletín Forestal, Chihuahua* 3 (35), 1951 (30–1, 35). [Span.]

Experience indicates that these species require a definite rainy season, annual rainfall exceeding 1600 mm. and maximum temperatures not exceeding 35° C. Direct sowing of *S. macrophylla* is preferable to transplanting; with adequate rain, germination has reached 80%. Transplanting of 1-year *C. mexicana* has given excellent results.

232.1. Choice and Trial of Species, Races, etc.

2879. Amerikaanse houtsoorten voor het Nederlandse bos. [**American species for Netherlands forests.**] *Rapport Studiegroep Bosbouw, Contactgroep Opvoering Productiviteit* 1951. pp. 77 + 20 photos. [Du.e.]

Discusses species of interest for forestry in the Netherlands, in particular *Pseudotsuga taxifolia* and *Quercus borealis*. Other species considered are: *Picea sitchensis*, *Abies grandis*, *Tsuga heterophylla*, *Thuja plicata*, *Chamaecyparis lawsoniana*, *Pinus contorta*, *Quercus velutina*, *Q. coccinea*, *Fraxinus americana*, *Liriodendron tulipifera*, *Robinia pseudoacacia*, *Populus deltoides*, *Ailanthus glandulosa*, *Rosa multiflora*, *Maclura pomifera*, *Poncirus trifoliata* and *Girgko biloba*. The importance of climatological data and of information on seed sources is emphasized. Methods of seed storage are discussed, and visits to the Morris and Arnold Arboreta described.

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 2963–6, 2968–70, 3007–8.

2880. FABRICIUS, W. Zustands- und Erfahrungsbericht über ausländische Holzarten im Forstbezirk Weinheim. [**Report on the state of, and experience with, exotic tree species in the Weinheim forest district.**] *Mitt. dtsch. dendrol. Ges.* (*Jb. 1950*) No. 56, [1951] (36–59). [G.e.]

Reports briefly, and in general terms, on the behaviour of 55 species of conifers and 25 of hardwoods from the forestry and/or dendrological points of view. Among the more remarkable trees are two specimens of Green Douglas Fir 44 m. high at 80 years of age.

2881. SCHMIDT, G. D. Die Weisstanne in Ostfriesland: ein ertragskundlich-biologischer Beitrag zum Weisstannenvorkommen ausserhalb des natürlichen Verbreitungsgebietes. [***Abies alba* in eastern Friesland: yield and biology of Silver Fir outside its natural range.**] *Forstwiss. Cbl.* 70 (11), 1951 (641–65). 41 refs. [G.g.]

Presents data on: (1) the increase in the area covered by Silver Fir in this region since 1790; (2) the location of the most extensive stands; (3) the history of its introduction and its management; (4) its most important pests and diseases; (5) yield, as shown by local yield tables; and (6) form and bark thickness.

2882. GOLJDIN, I. L. Vnedrenie èkzotov v centre evropeĭskoĭ časti SSSR. [**Introduction of exotics in the central part of Russia in Europe.**] *Lesn. Hoz.* 3 (9), 1950 (81–3). [Russ.]

Very brief notes on the large number of species under trial in the 'Tul'skie zaseki'.

2883. GAVRILOV, B. I. Sosna na Nižnedneprovskih peskah. [**Pine on the Lower Dnieper sands.**] *Lesn. Hoz.* 3 (8), 1950 (46). [Russ.]

Data from ca. 70-year-old stands show that the growth of *P. pallasiana* on these sands is much superior to that of *P. sylvestris* and of hardwoods. At 20 years old *P. pallasiana* on quality class I reaches a d.b.h.u.b. of 23·2 cm. and is ready for the start of long-term resin-tapping. Its volume increment exceeds that of *P. sylvestris* from the 40th year on. The u.b. volume [per tree] reaches 1·2725 cu.m. at 67 years of age. Where seams of rich clay-loam occur in the sand profile, the yield at this age reaches 650 cu.m./ha. Growth is satisfactory on poor sands without richer seams or buried soils, if the watertable lies at a depth of 1–2 m., but a higher watertable is definitely unfavourable. If the watertable lies deeper than 2 m., growth is also retarded and further study is needed to determine the comparative behaviour of *P. pallasiana* and *P. sylvestris* under these conditions. The author's studies of root systems have shown that the former species makes a stronger root system earlier in youth as compared with the latter. [Cf. *For. Abstr.* 13 (No. 2965).]

2884. TAKAHASHI, N. **Silvicultural value of White Pine in Hokkaido.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (1–11). 19 refs. [Jap.e.]

Pinus strobus is recommended in preference to *Picea jezoensis*, *Abies sachalinensis*, Japanese Larch or Norway Spruce, because it is suited to the climate, grows fast, is rarely damaged by rats, is suitable for a wide variety of sites and is easy to raise from seed, and because the wood has many uses. Data for these conclusions are drawn from literature and from 66 ha. of *P. strobus*, pure and in mixture, in the Tokyo University forest. *From author's summary.*

2885. **Longleaf and Slash Pines (*Pinus palustris* and *Pinus caribaea*) [in Delaware].** *Rep. Del. St. For. Dep. 1946/7*, 1947 (22).

Experimental plantings of these two species showed that neither could tolerate shade or root competition, but both did best on well drained sandy soils free of competing vegetation. Snow and frost had caused little more damage than to plantations of the native *P. taeda*.

2886. MADLEN, J. Duglaska—drevina budúcnosti? [**Douglas Fir—the tree of the future?**] *Lesn. Práce* 29 (1/2), 1950 (33–46). [Slovak.]

Presents the results of measurements conducted in the *Pseudotsuga taxifolia* plantation at the

Kysihybly arboretum near Banska Štiavnica (Slovakia). The plantation, begun in 1900, when 225 sq. m. were planted with 3-year Douglas Fir, is at 550 m. altitude, on a site of quality class II/III (Schwappach), average annual temperature 6·5° C., average rainfall 814 mm., predominant winds N. and NW. By 1922 the average 25-year stem had a d.b.h. of 17 cm., height of 15·31 m., and volume of 0·170 cu.m., corresponding to a yield of 544·78 cu.m./ha. for timber over 7 cm. diameter. In 1946, average figures were: d.b.h. 29·9 cm., total height 24·5 m., height up to 7 cm.diam. 21·0 m., volume 0·725 cu.m., equivalent to 1320·9 cu.m./ha. For maximum d.b.h., the optimum spacing was 2·8–3·4 m. The germination capacity of seeds for var. *viridis* was 76% in laboratory conditions, and 65% in the field. In mixed plantations near Banska Štiavnica (Douglas Fir, Spruce, Silver Fir, Beech, Hornbeam, Scots Pine, Weymouth Pine, and Oak), the following average figures were obtained from 109 trees of 43–45 years: basal area 0·1023 sq. m., corresponding d.b.h. 36·1 cm., height 23·50 m.

2887. LÁMFALUSSY, S. A vöröstölgy magyarországi viszonylatban való telepítése, faanyagának kiértékelése és a hazai tölgyekkel és cserrel való összehasonlítása. **[The cultivation of *Quercus borealis* in Hungary and a comparison of its timber with that of the other Hungarian Oaks and *Q. cerris*.]** *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (189–201). [Hu.g.russ.]

Q. borealis is recommended for planting in Hungary, particularly in districts where *Q. cerris* has replaced more valuable species. It is best grown in closed stands mixed with other species. Measurements on existing stands confirm that height and volume increment of *Q. borealis* are greater than those of native Oak species and *Q. cerris*. It is superior to *Q. cerris* in its freedom from frost-cracks, its fewer knots, its tolerance of alternately wet and dry sites, and its easy impregnation. It has no special insect or fungus pests. Its timber can be used for the same purposes as that of native Oaks, except the manufacture of barrel staves. [Cf. *For. Abstr.* 13 (No. 3306).] *From author's summary.*

2888. AGOSTINI, R. Contributo alla conoscenza del comportamento della quercia rossa in una particolare stazione dell' Italia meridionale. **[The performance of *Quercus borealis* on a particular site in southern Italy.]** *Ital. for. mont.* 6 (6), 1951 (303–13). 11 refs. [It.it.f.]

Gives growth data on a group of some 70 trees growing in an extinct volcanic crater near Naples, some planted in 1902 and others in 1914. Mast years occur at intervals of 3–4 years. D.b.h. varies between 46 and 64 cm. for the older and between 26 and 42 cm. for the younger trees; mean height of the two age classes is 23 m. and 20 m. respectively. Height growth was slow in the early stages (3–5 years) then increased rapidly, reaching a maximum at 15–20 years, and declining as rapidly after 25–30 years. Rate of diameter increment culminates later and maintains its maximum longer than that of height increment. Data are also given on volume of bark and branchwood, and form factor.

Two stems were analysed with the following results: Sapwood was confined to the outer 7 annual rings; width of annual rings varied from 1 to 13 mm. The wood is of medium density (sp. gr. 0·65–0·80). Mean value of modulus of elasticity was 103·327 kg./sq. cm. Mean values of resistance to static compression (*a*) parallel to the grain, (*b*) tangentially across the grain, and (*c*) radially across the grain were 380 kg., 150 kg., and 235 kg./sq. cm. respectively; tensile strength 1,062 kg./sq. cm., bending strength 650 kg./sq. cm.

From these results, the author concludes that *Q. borealis* could be usefully introduced into the zones of the *Castanetum* and *Fagetum* of the central and southern Apennines, provided that compact, calcareous clay soils were avoided.

2889. KISELEV, M. A. Issledovanie rosta duba krasnogo v uslovijah Orlovskoĭ oblasti. **[A study of the growth of Red Oak in Orlov Province.]** *Lesn. Hoz.* 3 (8), 1950 (75–8). [Russ.]

Tabulates some mensurational data for young (ca. 20- to 25-year-old) pure and mixed stands of *Q. borealis*, together with roughly comparable data for *Q. robur*, on three different sites at the forest-steppe experimental station, Meshcherskoe, Orlov Province, with a brief sketch of the climate and soils of the area, which lies in the northern forest-steppe zone on the slopes of the central Russian hills. Here soil moisture, rather than temperature, is the limiting factor for tree growth, and though the soil types differed on the three sites studied, the effective difference between them appeared to be soil moisture. On the moister soils *Q. borealis* grows faster in both height and diameter than *Q. robur*; it shows particularly rapid growth in the first 6–12 years. Both species grew better on the moister sites, but on the driest ones *Q. robur* did better than *Q. borealis*. Growth of *Q. borealis* was better in pure than in mixed stands; it proved reasonably drought- and frost-resistant and should be a promising species for shelterbelt plantations on relatively poor soils in the north-western, central and western forest-steppe zone.

2890. LOBAEV, N. I. Platan. **[Plane.]** *Lesn. Hoz.* 3 (9), 1950 (60–1). [Russ.]

Plane [*Platanus orientalis*] grows well in the Kuban steppes, N. Caucasia, where it attains a height and diameter of respectively 25 m. and 40 cm. at 18–20 years old, and is suggested as a promising exotic for this region. In stands, it will come through frosts of — 35° C. It is also long-lived and drought-resistant. Experiments in the region show that seed may be collected in Dec.–Jan. and stored indoors, with good ventilation, either in bags hung from the ceiling or in layers 8–10 cm. deep on shelves. It should be cleaned of its fluff about a week before sowing, and soaked in water at room temperature for 3–4 days. As field germination is poor, 4–6·5 g. seed/running metre must be sown, and covered with sifted leafmould or a mixture of sand and soil, to a depth not exceeding 2 cm. on open-textured or 0·5–1 cm. on compact soils. On poorly aerated soil either the seed fails to germinate or the seedling is too weak to push its way through. Watering the soil before and after sowing, is essential

in this region and must be continued until the seedlings have 4–5 leaves. The very delicate seedlings emerge 10–14 days after sowing and 3–5 days later they are 1–2 cm. tall. For the first 30–40 days protection against wind is necessary, as the shoots are killed by winds of 5–7 m./sec. One form of such protection is to sow in narrow sunken beds 20–25 cm. wide at right angles to the prevailing wind. Frosts of − 8 to − 10° C. are fatal at this stage, and sowings should therefore be made at the end of the main spring frosts, here usually about the second half of April. Some shade is needed in the first 2–2½ months: this can be provided by a loose covering of reeds, which also acts as a mulch and helps to provide wind protection. The growing season is completed by the end of September and no earthing-up or other winter covering is needed.

2891. Informe sobre el primer año (almácigos) de algunas especies forestales chilenas en Israel. **[Report on the first year (in the nursery) of some Chilean forest species in Israel.]** *Agricultura téc., Santiago* 10 (2), 1950 (79–82). 5 refs. [Span.] A.P.B.

Of 11 species sown in 1950 only the following germinated: *Robinia pseudoacacia*, *Sophora tetraptera*, *Acacia cavenia*, *Guevina avellana*, *Nothofagus obliqua* and *N. procera*. Notes on the nursery methods used and the development of the species are presented. It is thought that species from central or north-central Chile have the greatest chances of survival, especially if they are introduced into regions where the microclimate resembles that of their place of origin.

2892. **Artificial regeneration in upper, middle and lower hill forests of the Darjeeling district.** *Rep. For. Res. W. Bengal 1949/50*, 1951 (7–9).

(1) *Upper hill forests* (6000–8000 *ft.*): Plantations of *Tsuga dumosa*, *Pinus patula*, *Cupressus cashmeriana* and *Pinus excelsa*, were doing well. *Cedrus deodara* was a failure; *Pinus sylvestris* and *Larix leptolepis* looked unhealthy though their growth was reasonably satisfactory. In mixed broadleaved plantations *Alnus nepalensis* and *Betula alnoides* were growing fast and had overtopped all other species.

(2) *Middle hill forests* (3000–6000 *ft.*): The indigenous hill species, *Quercus lamellosa*, *Q. lineata*, *Q. semiserrata*, *Michelia excelsa*, *Acer campbellii*, *Bucklandia populnea* and *Cedrela febrifuga*, and the exotic *Cryptomeria japonica*, were sown in broken terraces and did quite well. *Pinus gerardiana*, planted out in the previous year, showed 70% survival; average height was 1·5 ft.

2893. MALHOTRA, M. K. **Note on *Salix alba* (Cricket-bat Willow) and Wicker Willow experimental planting [in East Punjab].** *Indian For.* 78 (2), 1952 (92).

Account of initial successes with cuttings flown from Kashmir to the Kulu Valley, 1949–51.

2894. HOWES, F. N. ***Conocarpus lancifolius* Engl.—an interesting Somaliland tree.** *Kew Bull.* 1951 (3), (323–4).

The tree, which shows promise under cultivation on the coastal plain near Berbera, is a useful source of fuelwood and building poles for houses. The seeds should be sown on a good tilth (but left uncovered), watered by hand for 4–5 months, then daily by flow irrigation for another 6 months, and every other day for a further 2 months, by which time the seedlings should be 9 in. high. Transplanting may take place after 12 (but preferably 18) months, and daily watering should continue until the roots reach down to a water supply. Transplanting in Berbera is frequently not done until the trees are 6 ft. high, when they are planted in holes 4 ft. or more deep, because (1) the watertable is about 5 ft. below the surface, and (2) intervening layers of coral have often to be penetrated.

2895. **[Teak in Upper Nile province.]** *Rep. For. Div. Sudan 1949*, 1950 (22).

Teak planted north of the Yirrôl Road in a light soil was well established in spite of possible elephant damage. At Malwal Chat, Teak planted in 1948 was fair, though not 100% established. Some trees had been killed by rats and mice tunnelling and gnawing their roots. At Terakikka some of the 1948 Teak had been killed by stagnant water collecting in depressions in the clay, but survivors showed vigorous growth judged by Upper Nile standards, many being over 10 ft. high.

2896. RAPPARD, F. W. Korte aantekeningen over de cultuur van *Eucalyptus deglupta*. **[Short notes on the cultivation of *E. deglupta*.]** *Tectona* 41 (1), 1951 (63–5). [Du.e.]

Termites attack roots of young *E. deglupta* planted out in the field; some trees die, others produce flowers and seed precociously. Good-quality seed may be produced by 2-year-old trees in these circumstances. Thinning of 2-year-old plantations yielded 6 cu.m. of poles and 16 cords of firewood per ha. Planting of an understorey of slow growing species is recommended; good results were obtained with *Tarenna incerta* and *Eugenia* spp. at 700 m. and above, and *Schleichera oleosa* is recommended for the lowlands.

232.12. *Races and Provenance Trials*

See also Nos. 2774, 2909

2897. SCAMONI, A. Ein Lärchenherkunftsversuch in Eberswalde und seine weitere Entwicklung. **[A Larch provenance trial at Eberswalde and its further progress.]** *Züchter* 21 (1/2), 1951 (36–8). 14 refs. [G.] A.P.B.

A further examination was made of trees of 7 provenances already examined at 7–9 years in 1942 [cf. *For. Abstr.* 4 (p. 90)]. Results (tabulated) show that trees of Sudeten and Silesian provenances continue to show the best height growth and largest d.b.h. while those from Upper Styria, from an altitude of 1300–1400 m., show poor height and diameter growth.

2898. ERTELD, W. Die Entwicklung einiger Kiefernprovenienzversuche im Land Brandenburg.] **[The progress of some Pine provenance trials in Brandenburg.]** *Züchter* 20 (3/4), 1950 (91–9). 4 refs. [G.g.] A.P.B.

Observations were made at Chorin in 1949 on height, survival, stem form, branching, diameter, basal area and volume of trees, planted in 1908, of

Belgian, S. French, Scots, E. Russian, E. Prussian, Brandenburg, Kurland and Rheinpfalz provenance, and at Finowtal in 1948 on height, diameter, branch thickness, needle length, stand density, and needle colour of 8-year-old trees, planted at different distances apart, of Finnish, Swedish, Latvian, Polish, Dutch, Rumanian, E. Prussian, Lausitz, Brandenburg, Hannover and Mainebene provenances. Results are given in graphs and tables and include the following: (1) There are few changes in trend at Chorin since the last examination in 1930; at Finowtal the East Prussian and Brandenburg trees are outstanding for good stem form and thin branches. (2) Eastern and northern provenances are of high quality but slow growth. (3) Trees of very distant provenances (southern France, Rumania and Scotland) generally show poor quality and growth; however, the E. Russian trees are of high quality and unusually slow growth. (4) The possibility of improving quality in Brandenburg, while maintaining yield, appears to be restricted to the use of seed from an area between E. Prussia and Kurland. (5) Close spacing favours thin branches but hinders height and diameter growth.

2899. SAATÇIOGLU, F. Ein Provenienzversuch mit Kiefern (*Pinus silvestris* L.) verschiedener Herkunft in der Türkei. [**A provenance trial with *P. sylvestris* from different sources, in Turkey.**] *Z. Weltforstw.* 14 (6), 1951 (179–86). 6 refs. [G.e.f.] [Silvicultural Department, Faculty of Forestry, University of Istanbul.]

Seed of 17 different provenances (Sweden, Norway, Finland, Scotland, Germany, France, Poland, Russia, Hungary, Rumania, and Turkey) was sown at Istanbul in 1940. Results of preliminary observations on growth after 11 years are given in graphs and tables. Average height in 1950 ranged from 63·2 cm. for Pines of N. Norwegian to 343·7 cm. for those of E. Prussian provenance; average diameter from below 1·3 cm. for N. Norway and Finland to 44·3 cm. for S.W. Germany. Pines from latitudes between 45 and 55° N. appear to give the best height growth. Few plants from provenances within the cool climate areas have survived. Rhythm of growth, change of colouring during the winter months, and premature flowering, are also related, to the latitude of the country of origin.

2900. MINCKLER, L. S. **Southern Pine from different geographic sources show different responses to low temperatures.** *J. For.* 49 (12), 1951 (915–6).

Observations on frost damage to 1 + 0 nursery stock and 3-year-old plantations of *Pinus taeda* and *P. echinata* in Illinois during the very severe winter of 1950–1 indicate that Southern Pines of the more southern and south-eastern provenances should not be used in and round southern Illinois.

2901. VEEN, B. Herkomstenonderzoek van de Douglas in Nederland. [**Provenance research on Douglas Fir in the Netherlands.**] *Proefschrift, Landbouwhogeschool, Wageningen* 1951. pp. 130. 71 refs. [Du.e.]

Characteristics of the areas where Douglas Fir occurs naturally are considered, and results of provenance research in other countries are outlined. Research in the Netherlands began in 1923, and during the next 8 years seeds of 35 known provenances (33 from Canada and the U.S.A. and 2 from the Netherlands) were introduced and established in sample plots in different parts of the country. These provenances are grouped into 4 classes, poor, medium, good and very good, on the basis of height measurements at 10–15 years. Later measurements (at 18–28 years) of volume per acre did not materially alter the order, although some provenances classed as medium gave surprisingly good results. In general, the more maritime provenances, especially from western and southern exposures, were better than the continental. Provenances from more than a few hundred metres above sea level, and from continental areas, grew too slowly in the Netherlands. Site preparation, and the species used in mixed plantations, greatly influence growth. The use of fertilizers, followed by green manuring, gives good results. Fast-growing, late-flushing provenances (i.e. those from the maritime areas) do not need protection against spring frosts. The more continental provenances, which flush early, are liable to damage by late spring frosts which reduces their vigour and disease resistance. Continental provenances are suffering from severe damage by *Rhabdocline pseudotsugae*. The number of trees infected by *Phomopsis pseudotsugae*, however, shows no correlation with seed provenance. Maritime provenances are more severely attacked but, because of their greater vigour, recover more completely. Site appears to influence the degree of attack. Continental provenances appear to be more susceptible to *Phaeocryptopus gaeumannii*. Damage by *Adelges cooleyi* is periodic and seldom severe; the green form of Douglas Fir is the preferred host.

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

See also Nos. 2773 *et seq.*

2902. LANGNER, W. Kreuzungsversuche mit *Larix europaea* D.C. und *Larix leptolepis* Gord. [**Hybridization trials with *L. decidua* and *L. leptolepis*.**] *Z. Forstgenet.* 1 (1; 2), 1951–52 (2–18; 40–56). Numerous refs. [G.g.]

Results from trials begun in 1936 at the Kaiser Wilhelm Institut für Züchtungsforschung in Müncheberg (Mark), are reported. Details of the methods used in crossing are given. The hybrid seeds were sown in 1937 and trial plots set up in 1939. The following aspects are described in some detail: (1) differences in growth due to variety or site, (2) relationship of height to diameter increment, (3) variations in growth habit and morphology, (4) age of sexual maturity, (5) relationship between cone-bearing and vigour of growth, (6) relationship between cone-bearing and stem form, (7) times of flushing and flowering, (8) loss of plants, and (9) attack by canker. The results of selfing are described, and the relationship between parent trees and progeny, the occurrence of natural hybrids, the laying-out of long-term trial plots, the nature of the genetic basis of growth vigour in the pure species and in hybrids, and the maintenance of high yield in the hybrids, were also studied. Growth vigour is maintained in the hybrids up to 13 years or more, and

is greater on unfavourable sites than on favourable ones. Height and diameter increment are not directly proportional, diameter increment often exceeding the relative height increment. The best criterion of the growth of progeny from a single cross is given by the average height and diameter values of the tallest and biggest third of the trees in the stand. *Larix leptolepis* reacts most strongly to changes in site, *L. eurolepis* (i.e. *L. decidua* ♀ × *leptolepis* ♂) and *L. decidua* less strongly, and *L. lepteuropaea* (i.e. *L. leptolepis* ♀ × *decidua* ♂) least of all. Growth habit shows characteristics mid-way between those of *L. decidua* and *L. leptolepis*, but there was considerable variation between the progeny from different individuals. The genetical cause of vigour in the hybrids seems to be their greater heterozygosity. Even greater results are to be expected from crosses of pure species from different localities with similar climatic conditions, if they are reared in a like climate. The advisability and possibility of obtaining seed from grafts is discussed. [Cf. *For. Abstr.* 12 (No. 2492).]

2903. Scamoni, A. Uber die weitere Entwicklung künstlicher Kiefernkreuzungen in Eberswalde. **[The further development of artificial Pine crosses in Eberswalde.]** *Züchter* 20 (1/2), 1950 (39–42). 5 refs. [G.] A.P.B.

A further examination was made in 1948 on *P. sylvestris*, sown in 1928, 1929 and 1933, resulting from crosses within the same provenance or between different provenances [cf. *For. Abstr.* 1 (p. 236)]. The following results were obtained: (1) Height development of trees from crossing within the same provenance was the same in the second generation as in the parents. (2) Heterosis found in the earlier examination of crosses between trees of different provenance had disappeared, and there was a tendency for trees to come somewhere between the parents in quality. (3) The crooked stem of the S.W. German Pine appeared to be a dominant character; the less outstandingly poor stem form of the French provenance did not. (4) Selfing in *P. sylvestris* and *P. mugo* yielded progeny with low vitality, poor stem form and stunted growth.

2904. Białobok, S., and Bugała, W. Przegląd prac hodowlanych nad topolami i wyniki dotychczasowych obserwacyj przeprowadzonych nad niektórymi mieszańcami topoli w Kórniku. **[Survey of studies on Poplar growing and results of available observations on some Poplar hybrids at Kórnik.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 7, 1951 (130–58). 13 refs. [Pol.pol.e.]

An account is given of 20 Poplar hybrids (produced by Schreiner & Stout) at the Kórnik arboretum, covering rate of growth, crown shape and stem growth during the early years, resistance to *Melampsora* sp., and frost-hardiness. It was found that Frye, Roxbury, and Rumford Poplars suffered frost damage in 1939–40; Andover, Rochester, and Maine Poplars are also not very frost-hardy and grow slowly in Poland; Androscoggin, Geneva, Oxford, and Strathglass Poplars are frost-hardy and grow well even on sand. All the hybrids are resistant to *Melampsora*.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 2719, 2955, 3002–3, 3072, 3539.

2905. Seperovič. Posadka sejancev sosny s posevom kukuruzy v Voronežskoĭ oblasti. **[Planting Pine seedlings in combination with maize sowings in Voronezh.]** *Lesn. Hoz.* 3 (9), 1950 (85). [Russ.]

Despite previous claims that, on sands in Rostov and Voronezh Provinces, *Salix acutifolia* is valuable for protecting young Pine plantations from abrasion by sand [cf. *For. Abstr.* 12 (No. 2926)], the author's experience is that the Pine grows better in the absence of competition from this Willow, the planting of which involves an extra cost of 100–150 roubles/ha. He suggests a method of growing maize between the Pine rows in the first two years as a means of preventing sand abrasion.

2906. Holder, E. D. **Oaks under rye.** *J. Land Agents' Soc.* 51 (2), 1952 (63–6 + 4 photos).

In 1949 three areas of rough grass and heather in Nottinghamshire, about 6 acres each, were disked, ploughed, disked again, limed, combine-drilled with rye and fertilizer, harrowed and rolled. Acorns of Sessile Oak were sown 1½ in. deep, 4–5 at a time, on 8-in.-square patches 2 ft. apart in rows 4 ft. apart. The whole area was then rolled once more. Two of the plots were fenced against rabbits, etc. Oats took the place of rye on part of one plot. Rye and oats were harvested with a combine to leave a high stubble for the protection of the seedlings. Stocking varied from 70% on Plot C (unfenced, oats, and 3 tons of lime per acre) to 85 and 100% respectively on Plots A and B (fenced, rye, and 2 tons of lime per acre). In spite of the numerous vermin, in nearly every case at least one acorn of each group had survived. The summer of 1949 was very dry, and there is no doubt that the young seedlings received great benefit from just the right amount of shade afforded by the thin-stalked rye. Total cost of operations, less receipts from the corn crops, worked out at just under £17/acre including fencing. [Cf. *For. Abstr.* 12 (No. 1989); 13 (No. 2977).]

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

2907. Melihov, P. S. Organizuem lesosemennye hozjaĭstva. **[Suggestions on the] organization of forest seed supplies [in the U.S.S.R., with special reference to Oak and Pine].]** *Lesn. Hoz.* 3 (9), 1950 (68–73). [Russ.]

2908. Gorohov, B. A. O semenah kedra koreĭskogo. (***Pinus koraiensis* seed.**) *Lesn. Hoz.* 3 (9), 1950 (86). [Russ.]

Korean Pine, the most important species of the mixed coniferous/deciduous forests of the Soviet Far East, begins to bear cones at 40–60 years of age. Seed years occur every 4–5 years, and the seed ripens in Sept.–Oct., 16–18 months after fertilization. Studies by the Far-Eastern Seed-testing Station have shown that seed collected in Sept.–Oct. has a field germination % of 65–70, that from Jan.–March collections being inferior. Stored seed is sensitive

to both frost and heat, but if stored indoors at 0–5° C. in moist sand, it will keep for 2 years and give satisfactory germination.

2909. YOUNGBERG, C. T. **Effect of origin and growth conditions of Norway Spruce (*Picea excelsa*) on the chemical composition of seed and physiological characteristics of nursery stock.** *Proc. Soil Sci. Soc. Amer. 1950* 15, 1951 (376–9). 22 refs. L.S.

Seed collected from three soil types of widely different levels of fertility in Wisconsin, and from Sweden and Austria, were compared. The amount of nutrient elements and ether-solubles varied widely in seed of different provenance. Nutrient content was not related to the initial rate of seedling growth, though the highest rate of mitotic chromosome division was observed in the seed having the highest content of nutrient elements. Marked variations were observed in the growth rates of seedlings of different provenance, in their capacity to take up nutrients, and in their morphological and physiological properties.

2910. KANTOR, J. Přispěvek k pěstěni břizy. [**Birch growing.**] *Lesn. Práce* 29 (9/12), 1950 (397–478). 40 refs. [Cz.cz.russ.e.]

The object of the study was to obtain from a given number of seeds the highest possible number of seedlings that would show the best degree of adaptation to the environment. Birch was selected as the test species because it has a very low plant % (ca. 0·1). The various Birch species and hybrids (mostly *Betula pubescens, B. verrucosa, B. carpatica*) were dealt with as a single species. The test material was collected in 1947–8 from 35 trees in various parts of Czechoslovakia (lowlands near Kromeříz, Bohemia; undulating country near Brno, Moravia, and the highlands of Slovakia), totalling 182 samples. On an average one ♀ catkin contained 450 seeds, 5500 catkins went to 1 kg., and 1000 clean, sound Birch seeds weighed ca. 1 g. Only 11% of the seeds were infected with *Oligotrophus betulae*. The germination tests were conducted by means of a modified Jacobsen apparatus. The low germination % can be explained by the large proportion of unsound or desiccated seeds. The test yielded the following results: (1) Birch seeds preserve their viability for more than 2 years, after which it declines increasingly; (2) when stored in dry laboratory air, the germinative capacity of the seeds was always ½ to ⅓ that of seeds stored in a laboratory room where the air humidity and temperature varied considerably; (3) the maximum germinative capacity was found in seeds from the top ⅓rd, and the minimum in those from the bottom ⅓rd of the catkin; (4) the germinative capacity did not depend upon the position of the catkin in the tree crown, but did depend upon whether the tree formed part of a dense stand or an open one: in mountains, seed from the dense, and in lowlands from the open stands showed highest germination; (5) the time of seed collection has no effect on germinative capacity; (6) seeds should be collected from trees of 20–60 years (solitary trees 15 years); (7) trees bearing an average seed crop give seeds of the best germinative capacity; (8) the germinative capacity varies inversely with altitude (markedly so in a severe climate). Seedlings were raised in a hotbed (stable manure mixed with last year's leaves), the seeds being simply spread on the surface; preliminary experiments showed that the germination and survival of seeds embedded in soil at any depth (even 1 mm.) were small compared with those of seeds left uncovered. Experiments carried out with large quantities of seed (e.g. 14,000) showed that survival of seedlings increased considerably when the sowing density was smaller. It was possible to obtain 33 one-year seedlings for every 1000 seeds of 25% germination, which is 33 times as many as in the open, and this in spite of excessive sowing density. These seedlings averaged 23 cm., in height, with roots 15 cm. long. These results were obtained with a top layer of humus. With top layer of compost-soil mixed with a large proportion of lime, the figures dropped to 5 seedlings/1000 seeds, height 15 cm., root length 23 cm.; with ordinary nursery soil, to 15 seedlings/1000, averaging 4·5 cm. high and with a root length of 14 cm.

232.311. Seed Production (Seed Years, Seed Crops etc.)

See also Nos. 2775–6, 2838.

2911. TROUSDELL, K. B. **Forecasting Loblolly Pine cone crops.** *Sth. Lumberm.* 183 (2997), 1951 (137–8).

Further tests of the method already described [cf. *For. Abstr.* 12 (No. 267)] confirmed the accuracy of forecasts made 6 or 12 months in advance.

2912. DUFF, G. H. **[Red] Pine seed project.** *Progr. Rep. Field Lab. Proj. Ont. Dep. Lds. For. 1950/51*, 1951 (40–6).

Summarizes the progress made in research on seed production etc. of *Pinus resinosa*. The following subjects are covered: premature cone production; the effect of synthetic growth substances (2,4-D, naphthalene acetic acid [NAA], and triiodobenzoic acid [TIBA]) on cone production; insect parasites of cone and shoot; and influence of oxygen supply on embryonic growth.

2913. MIROV, N. T. **Inducing early production of Pine pollen.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 80, 1951. pp. 2 + 4 photos.

Seedlings of different species of Pine were transplanted into gallon cans in the autumn, and were grafted by inarching to a mature Ponderosa Pine, prolific in its production of pollen and conelets, in the following spring. Seedlings of *P. torreyana, P. contorta* var. *latifolia, P. sabiniana, P. ponderosa*, and a hybrid between *P. jeffreyi* and *P. coulteri*, flowered at the beginning of the third growing season, i.e. about 2 years after the seedlings were grafted. Grafted seedlings of *P. caribaea* did not produce pollen during the 2 years. No ♀ flowers were produced, probably because the seedlings were grafted to the lower part of the crown, which was producing an abundance of ♂ flowers, while the upper crown was producing ♀ flowers. Experiments on the inducement of ♀ flowers are being conducted at the Institute of Forest Genetics.

2914. HOLMES, G. D., and MATTHEWS, J. D. **Girdling or banding as a means of increasing cone production in Pine plantations.** *For. Rec. For. Comm., Lond.* No. 12, 1951. pp. 8. 5 refs. Price 6*d*.

An experiment was begun in 1948 to test several methods of stimulating flower production in 20-year-old Corsican Pine. The investigation is being continued, but the following conclusions have been arrived at. Stem girdling increased cone production in the second season after treatment. Trees of large girth and crown produced more cones per tree than trees of small girth and crown, whether treated or not. Girdling had more effect on the larger than on the smaller trees. There was no statistically significant difference between the different methods of girdling or banding, though the use of metal bands gave appreciably lower cone production than the other methods tested. Girdling in the form of a continuous knife incision round the stem at breast height gave the highest cone production. Girdling was most effective when applied in May and least effective when applied in January. The health and vigour of the treated trees remained unaffected two years after application of the treatments. Treatments involving two semi-circular cuts caused the most swelling of the stem and metal bands the least.

232.312. Seed Collection, Extraction and Grading

See also Nos. 2890, 2908–10, 2929, 2966.

2915. Kočkarj, N. T. Zavisimostj vyhoda semjan sosny obyknovennoĭ i ih vshožesti ot veličiny šišek. [**Correlation of yield and germination of *Pinus sylvestris* seed with size of cone.**] *Lesn. Hoz.* 3 (8), 1950 (82–3). [Russ.]

Results of a study made in 1950. Cones were divided into 3 size groups: (1) > 4·5 cm. long × > 2·5 cm. diameter; (2) 3–4·5 × 1·5–2·5 cm.; and (3) < 3 × < 1·5 cm. Both number of seeds per cone and average weight per seed varied directly with size of cone. In group (1) there were 76 cones/kg., with an average number of seeds per cone of 28, and average weight per seed of 8·25 mg., and a yield of 2128 seeds per kg. of cones. For (2) the corresponding figures were respectively 128, 20, 6·1 and 2560; and for (3), 220, 10, 4·8 and 2200. Seed was extracted from 100 kg. of cones of each group in a kiln maintained at 45–55° C. Cones of group (1) were the first to begin opening, followed in order, at 40-minute intervals by (2) and (3), the total extraction periods being respectively 52, ca. 59, and 64 hr. The yields/100 kg. cones were respectively 1380, 1460 and 940 g. Laboratory germination tests made on 100 seeds of each group showed that group (2) had the highest germinative capacity and energy. Group (1) showed practically the same germinative capacity but a considerably lower energy of germination. Figures for (3) were very much inferior, the germinative energy, in particular, being only 5%, and some 30% of the seed being empty or unsound. Evidently the medium-sized cones give the best all-round results, though the large cones also are worth collecting. The small cones, however, should not be collected.

2916. Leslie, A. P. **Silvicultural Research 5: Experimental collection of Black Spruce seed [after logging].** *Progr. Rep. Field Lab. Proj. Ont. Dep. Lds. For. 1950/51*, 1951 (61–2).

The cone-laden tips of slash tops were severed with an axe, placed on a small tarpaulin, and given several sharp blows with an axe; the resulting debris of seed, needles and bark was put in a sack, and the seed was later cleaned. Preliminary results indicate that this method of collecting Black Spruce seed may well be practical if the necessary precautions are taken. Seed gathering should begin as soon as the cones open in spring. There is some indication that most of the seed is lost during the first summer after logging. Seed collected in this manner was very difficult to clean, but germination tests indicated that most of it was viable.

2917. Leslie, A. P. **Silvicultural Research 6: Field extraction of Jack Pine seed.** *Progr. Rep. Field Lab. Proj. Ont. Dep. Lds. For. 1950/51*, 1951 (62–3).

Cones gathered from fresh slash were subjected to extraction tests, using solar radiation in conjunction with aluminium reflectors as the source of heat. The reflectors were placed behind the extracting trays so that the cones received both direct and reflected light. The trays were covered with window glass and thoroughly insulated to reduce loss of heat. It was found that Jack Pine cones could be opened within 4 hours on bright sunny days provided that there was only one layer of cones in the bottom of the trays. Yield of seed was greatly increased by shaking the open cones. Temperatures up to 181° F. could be obtained. At no time did the relative humidity in the trays drop below 38%. The treatment appeared not to affect seed viability.

2918. **Collection and storage of acorns and Beech mast.** *For. Leafl. For. Comm., Lond.* No. 28, 1951. pp. 8. Price 4*d.*

232.314. Seed Purchase, Trade and Transport

2919. Derjabin, D. Transportirovka želudeĭ v vagonah. [**Transport of acorns in railway wagons.**] *Lesn. Hoz.* 3 (10), 1951 (73–7). [Russ.]

Analyses results of railway transport of acorns in large quantities (for shelterbelt sowings) from the Tartar and Chuvash A.S.S.R. to Chkalov and Voronezh provinces in autumn 1949 (4–18 days transit) and from the Tartar A.S.S.R. to the Bashkir A.S.S.R. and the Omsk region in spring 1950 (4–10 days). Emphasizes the need for good aeration and cool conditions during transit, and concludes that autumn transport is much to be preferred, since far less damage is caused to the seed, the dormant seeds need less care and costs are therefore lower, and at the destination the storage method best suited to local conditions can be used.

232.315. Seed Storage and Treatment

See also Nos. 2879, 2890, 2908, 2910, 2918, 2929

2920. Zaĭceva, A. A. Zimnee hranenie semennyh želudeĭ. [**Winter storage of seed acorns.**] *Lesn. Hoz.* 3 (10), 1950 (63–72). [Russ.]

The author details results of her experiments in 1949–50 on the storage of *Quercus robur* acorns collected in Moscow Province, with incidental discussion of the findings of some other Russian authors [no bibliography is provided], under the

heads: moisture of acorns, fungal infection, temperature, and atmosphere. Conclusions are as follows: Only high-grade seed should be stored, and careful sorting is therefore necessary. Maintenance of a high moisture content is essential: storage should follow as soon as possible after collection; drying and turning over with spades are deleterious. Seed stored between layers of moist sand at a constant temperature of ca. 0° C. (in refrigerators) swelled sufficiently to split the outer coat and admit O_2 to the embryo, but remained on the point of growth without actually starting to grow, and showed no deterioration for 10 months (2% of infected acorns; the same as at the beginning of storage) and subsequently germinated quickly and well. Under the same conditions, but stored moist without sand, acorns of rather lower grade showed no lowering of quality, although sound and unsound acorns were in direct contact. Acorns with unsplit coats were not affected by – 5° maintained for 25 days, but it killed those with split coats in a few days; – 10° killed 50% of the seed in the first two days; – 15° was lethal to all seed, but caused no external colour change; – 20° and lower, produced a characteristic change in colour of the seed-coat to a lighter, greyish hue. The ideal temperature appears to be about 0°, and it should be easy to maintain this in practice in trenches cooled with natural ice. During transport, wagons must be cooled to between 0° and – 5°. Practically nothing is yet known in detail of the effect of O_2/CO_2 ratios in the storage atmosphere, though there must be some critical value beyond which increase of CO_2 will have toxic effects due to the products of anaerobic respiration, and the stored seed will heat up. Some figures for respiratory activity obtained by the author, show that the CO_2 production of 1 kg. of acorns per 24 hr., given adequate O_2, rises very steeply with an increase of temperature from 0° to 20°. Meanwhile it is not at all clear what the O_2 requirement of stored acorns may be, and whether trenches should be ventilated or not. Research on this problem is urgently needed, as also are studies of the variation in frost resistance of acorns from different regions.

2921. AKAMINE, E. K. **Germination of seeds of Koa Haole (*Leucaena glauca* (L.) Benth.).** *Pacific Science, Honolulu* 6 (1), 1952 (51–2). 1 ref. E.M.B.

Germination tests on untreated seed of *Leucaena glauca* showed that the time required for maximum germination under optimum conditions in the soil varied from 1 to 4 years, according to the number of hard seeds in the series. Under ordinary conditions prolonged storage tends to extend the dormant period; seed may remain viable for as long as 10 years.

2922. **Acacia seed germination.** *Journal of the Department of Agriculture of South Australia, Adelaide* 54 (6), 1951 (301). L.S.

Describes briefly 3 methods of breaking the seed coat in *Acacia* spp.: (1) by placing among dying embers, (2) abrasion, and (3) boiling for 1 minute, removing immediately from the water, and planting shortly afterwards.

2923. CAVAZZA, L. **Sul differente comportamento dei semi duri di tre diverse leguminose. [The different behaviour of the hard seeds of three species of Leguminosae.]** *Nuovo G. bot. ital.* (*n.s.*) 58 (1), 1951 (13–26). 14 refs. [It.it.e.] A.P.B.

Experiments in heat treatment of seeds of *Gleditsia triacanthos*, *Dorycnium rectum* and *Hedysarum coronarium* are discussed. Seed of *G. triacanthos* requires prolonged soaking in hot water, and the treated seed should be dried as rapidly as possible, so as to prevent, at least temporarily, the return of the 'hard' state.

2924. ZABOROVSKIĬ, E. P. Podgotovka semjan beloĭ akacii k proraščivaniju. **[Pre-treatment of Robinia seed to hasten germination.]** *Lesn. Hoz.* 3 (8), 1950 (70–1). [Russ.]

The U.S.S.R. standard method—immersion for 5 sec. in boiling water, then re-immersion when the water has cooled to 70° C., and allowing to stand for 24 hr.—has been found by several seed-testing stations to damage too high a % of the embryos. Experiments were therefore made by the Central Forest Research Institute (CNIILH) to discover the best method of treatment out of the following: (1) filing the seed coat at the end opposite to the radicle; (2) immersion for 30 or 60 min. in conc. H_2SO_4, washing in tapwater and allowing to stand for 24 hr. in water at room temperature; and (3) various modifications of the boiling-water method. Method (2) gave the highest germination percentages: 80 and 83% respectively after 7 and 15 days for seed given the 30-min. treatment; 83 and 84% for that steeped for 60 min. Next best, giving a germination of 64–80% after 7 and 79–80% after 15 days, were 4 of the boiling treatments: (*a*) and (*b*) boiling for 10 or 15 sec., followed by soaking for 24 hr. at room temperature; (*c*) and (*d*) boiling for 3 or 5 sec. followed by 3 min. in cold tapwater, followed by two repetitions of this cycle. Results of all treatments are tabulated. It is noted that the hardness of the seed coat may vary considerably according to condition (time of collection, moisture content etc.) and genetic constitution, so that identical treatments may give correspondingly variable results. Seed collected too early, e.g. end of Sept. to end of Oct., had coats too soft, and too high a moisture content, to withstand treatment with boiling water.

2925. BARTON, L. V. **Germination of seeds of *Juniperus virginiana* L.** *Contr. Boyce Thompson Inst.* 16 (8), 1951 (387–93). 8 refs.

Seeds of *J. virginiana* possess dormant embryos that require a period of 3 months at 5° C. to afterripen; 1° C. is less effective and 10° C. totally ineffective. A large % of seeds have impermeable coats, which may be made permeable by exposure to moisture at a temperature of ca. 25° C. for 2–8 weeks or by soaking for 30 min. in concentrated H_2SO_4. Such treatment should precede stratification. *From author's summary.*

2926. CRAM, H. W. **Spruce seed viability: dormancy of seed from four species of Spruce.** *For. Chron.* 27 (4), 1951 (349–57). 5 refs.

A study was made of the effect of stratification on the germination of seed of *Picea glauca*, *P. glauca* var. *albertiana*, *P. pungens* and *P. abies*. The only seed available was two years old, but the following

conclusions seem evident. Stratification for 50 days gave significant increases in germinative energy for all species. Seedbed germination of seed stratified at a temperature range of 34–49° F. was equal to that of seed stratified at a more or less constant temperature of 41–45° F. Dry storage at low temperatures gave no better results than dry storage at room temperatures. Seed of *P. glauca* and *P. glauca* var. *albertiana* showed a strong and general dormancy; seed of *P. pungens* varied from moderate to no dormancy depending upon the seed tree; and seed of *P. abies* showed a mild form of dormancy. It is recommended that stratification be adopted as a standard nursery practice for Spruce seed.

2927. BERRY, D. W. **Pumice as a medium for stratifying seeds.** *Res. Notes Ore. Bd. For.* No. 5, 1952. pp. 7. 7 refs.

The material compared favourably with sand and peat for moisture-holding capacity, its weight is less than a third of that of sand, it can be obtained in relatively sterile condition, and is available in Oregon in large quantities at a very low cost.

2928. SCHRÖCK, O. Stimulierende Wirkung des Colchicins bei der Keimung und dem Wachstum der Sämlinge. **[The stimulating effect of colchicine on germination and seedling growth.]** *Züchter* 21 (4/5), 1951 (142–9). 13 refs. [G.g.] A.P.B.

Seeds of Birch (*B. verrucosa* and *B. pubescens*) were soaked for 24 or 48 hr. in an 0·2% colchicine solution, or for 24 hr. in water. The following results were obtained: (1) The germinative energy of freshly collected Birch seed was reduced by the treatment with colchicine solution, but the viability was not affected. (2) Seeds stored for 3 months without loss of germinative energy or viability were not affected by colchicine treatment. (3) Storage for 5 months somewhat reduced the germinative energy of seeds, but this was increased by treatment with colchicine, viability remaining unaffected. (4) At the concentration used, the effect of the colchicine treatment was greater after the 48- than after the 24-hr. period of soaking. (5) The growth vigour of seedlings from colchicine-treated seeds was higher than that of the controls. This increase was still noticeable after 18 months. (6) The effect on vigour varied even in the progeny of individual trees. [Cf. *For. Abstr.* 13 (No. 2780).]

232.318. Seed Testing. Germination Tests. Seed Quality

See also Nos. 2909, 2915, 3192.

2929. HUSS, E. Skogsforskningsinstitutets metodik vid fröundersökningar. **[Methods used at the Swedish Forest Research Institute in seed investigations.]** *Medd. Skogsforsknlnst., Stockh.* 40 (6), 1951. pp. 82. 12 refs. [Sw.e.]

A detailed account, illustrated by 28 photographs, of methods used for Scots Pine and Norway Spruce seed [cf. *For. Abstr.* 11 (No. 243)], under the following heads: (1) Definitions and quantitative units applicable to cones, seed, germination tests and seed categories, with a list of necessary apparatus. (2) Rules for cone collection. (3) Cone storage, with special reference to the deleterious effects of damp on Spruce seed in the cone. (4) Selection of cone samples. (5) Seed extraction: procedure and apparatus. (6) De-winging and cleaning of seed. (7) Seed sampling. (8) Germination tests (including *inter alia* the determination of seedling development after 10 days as judged by fresh weight of the seedling minus the seed coat, the cutting test for ungerminated seed—with a note on the use of vital staining with 'Grodex', and the recording of results). (9) Seed storage.

An abridged version is used for instructing staff at the Institute. There is a 30-page English summary, and the legends of illustrations are also translated into English.

232.32. *Plant Rearing. Nursery Practice*

See also Nos. 2890–1, 2894.

2930. CREECH, J. L., and DOWDLE, R. F. **Propagation of *Strophanthus*.** *Econ. Bot.* 6 (1), 1952 (48–54).

Presents preliminary data on seed germination of *Strophanthus* spp., methods used in raising seedlings in the greenhouse, and methods of propagating from cuttings.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 2739, 2827, 3019.

2931. KODRIČ, M. Naše gozdne drevesnice in njihovo izboljšanje. **[Our forest nurseries and their improvement.]** *Gozd. Vestn.* 9 (5/7), 1951 (132–7). [Sloven.]

General information on the choice of site and preparation of soil for nurseries. As most of the Slovene nurseries have an abnormally low humus content (chemical analyses of soils in two places are presented), the use of various fertilizers is recommended.

2932. **[Soil treatments for nursery seedbeds.]** *Rep. Del. St. For. Dep. 1950/51*, 1951 (15).

Experiments were made to compare soil treatments (*a*) with formaldehyde and with chloropicrin, and (*b*) with a 2-in. layer of Pine needles and with a 2-in. sawdust mulch [species not stated], both rotary tilled. By midsummer there was no difference in results of the two treatments of experiment (*a*), but a sharp distinction appeared between the treatments of experiment (*b*), the sawdust-treated area being characterized by the noticeably poor colour and survival of seedlings, with the heaviest loss and deepest yellowing among Douglas Fir.

Experimental use of plastic screen wire which passes 57% of light compared with the 50% of the usual lath screens, was a failure, the amount of light being too much for the seedlings.

2933. ONO, M., SHIBATA, N., and HOSHINO, H. **Trials of fertilizers in the Suchi nursery. 1. Effects of N, P, K, and Ca on the growth of Sugi or Hinoki seedlings.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (85–8). 12 refs. [Jap.e.]

Analyses of soils in the nursery showed deficiencies in available N, P and K. The effects of additions of these minerals and also CaO on the growth of Sugi (*Cryptomeria japonica*) seedlings are tabulated

and recommendations made on rates of application. *From authors' summary.*

2934. Shibata, N., Ono, M., and Hoshino, H. **Trials of fertilizers in the Suchi nursery. 2. Effects of Mn, Mg, Zn and B on the growth of seedlings of Sugi and Hinoki.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (88–90). 5 refs. [Jap.e.]

The use of the sulphates of Mn, Mg, Zn or B or boric acid, with a fertilizer containing N, P_2O_5, K_2O and CaO, had a remarkable effect on seedling growth of *Cryptomeria japonica* and *Chamaecyparis obtusa*. The use of these compounds without the fertilizer had little effect. Recommendations are made on rates of application. *From authors' summary.*

2935. **Fertilizers: Trade regulations in OEEC countries.** *OEEC Documentation, Paris* 1951. pp. 78. Price 5*s*.

232.323. Sowing and Covering

See also No. 2910.

2936. Rakušček, K. Racionalizacija rada u šumskom rasadniku. Valjak za pravljenje brazdica. **[Rationalization of work in the forest nursery. A roller for making furrows.]** *Šum. List* 75 (8/10), 1951 (297–8). [Croat.]

An illustrated description of a furrowing roller designed by V. Beltram in Slovenia. The roller is made from sheet iron 6 mm. thick, with a length of 120 cm. and a diameter of 32 cm. It weighs ca. 100 kg. and is supplied with 12 rings which can be attached to the roller by screws. The width of the rings is 10 mm., their thickness 25 mm. Thus furrows 25 mm. deep, and any multiple of 10 mm. wide, can be easily made. A wooden roller of identical construction is recommended for smaller nurseries.

2937. Gorovoĭ, I. L. Torfjanaja kroška—cennyĭ material dlja pokryški posevov semjan. **[Granulated peat—a valuable material for covering sowings.]** *Lesn. Hoz.* 3 (8), 1950 (73). [Russ.]

Granulated peat has been used for some years to cover sowings in several nurseries in the Chernigov region, Ukraine, where it helps to conserve moisture and is beneficial to seedling growth especially if left between rows for the whole summer. In spring 1944, sowings of *Pinus sylvestris* on two adjacent nursery plots, each of 0·15 ha., were covered (*a*) with old straw and (*b*) with granulated peat at the rate of 10 tons/ha. When seedlings emerged, the coverings were removed from the rows and left in between them. A check at the end of the growing season showed 1·4 million seedlings/ha. on (*a*) and 2·1 on (*b*).

232.324. Transplanting and Lining Out, including Grading of Seedlings

2938. Wiksten, Å. Några försök med omskolning av tall och gran. **[Research on transplanting Pine and Spruce.]** *Norrlands SkogsvFörb. Tidskr.* 1950 (2), (231–68). 21 refs. [Sw.] (*Medd. Skogsforsknlnst., Ser. Uppsatser* No. 16.)

Investigations were made in nurseries in different parts of Sweden on the effects of exposing the roots to direct sunlight for different periods, of the date of transplanting, and of the size of the plants, survival and growth, 1–2 years after transplanting. Results are given in graphs and tables and show that: (1) Roots should be exposed as little as possible, at most 5–10 min., to drying out; puddling the roots often gives good protection for up to 30 min. (2) Transplanting should be done as soon as possible after frost danger is past. In S.W. and central Sweden, April and May seem to be the best months, but the season in Norrland lasts about a fortnight longer. In areas with high rainfall, the season for Spruce can be extended until mid-July. (3) The transplanting season for large plants is longer than for medium plants. Small plants should be discarded.

2939. Kedzierski, Z. Badania nad rozwojem na uprawach siewek sosnowych różnej jakości dla znalezienia podstaw sortowania. **[Investigations on the development of Pine seedlings of various quality, conducted for discovering grading principles.]** *Sylwan* 95 (1), 1951 (114–9). [Pol.pol.russ.]

The seedlings tested were divided into 2 groups ("strong' above 5 cm. and 'weak' below 5 cm. in height), and each group again into 4 classes according to the amount of lateral branching and apical-bud development. It was found that the strong plants had 20% greater growth than, and only half the mortality of the weak ones. Branched plants displayed better growth and less mortality than unbranched plants.

232.325. Tending (in both Seedbeds and Transplant Beds)

See Nos. 2932, 2937, 3081–2.

232.327. Protection Measures in Nurseries

See also No. 2932.

2940. Nohara, Y., and Zinno, Y. **Research on the prevention of damping-off and root rot of coniferous seedlings in the nurseries. (Second report.)** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (151–3). [Jap.e.]

Of 7 inorganic fungicides, a mercuric compound gave the best laboratory and field results. (2) All treated areas gave better results than untreated areas. (3) No damage to seedlings from fungicide application at the concentration used was found over 2 years. *From authors' summary.*

2941. Orłoś, H. Zwalczanie mączniaka, *Microsphaera alphitoides* Griff. et Maubl., w szkółkach dębowych. **[Control of *M. alphitoides* in Oak nurseries.]** *Prace Inst. Bad. Leśn.* No. 67, 1951. pp. 49. 25 refs. [Pol. russ.f.]

Presents the results of studies conducted in 1947–9. The following S preparations were examined: flowers of sulphur, sulphur/lime liquid, and 'Warsaw liquor' (sulphur/lime liquid mixed with a synthetic resin), as well as the preparation Thiovit-Sandoz. These had moderate and variable efficacy. Shading of the Oak seedlings with lupins was also tested, and found to be the best and cheapest method of control, despite the slight suppression involved. Lupins should be sown between the rows of Oak seedlings immediately on their emergence, using

0·5 kg. of seeds/are, and sowing several seeds together at 12·5-cm. intervals. The lupins should be thinned during summer, and cut late in September. When using chemicals, spraying or dusting is to be done thrice at 3-week intervals, the first treatment being applied at the first flush of Oak leaves.

232.328. Vegetative Propagation

See also Nos. 2775–6, 2814, 2930, 3538.

2942. Multiplication végétative. [Vegetative propagation.] *Rapp. Fonds for. nat. Jan.–Juin 1951*, 1951 (40–1). [F.]

Experiments were made at Les Barres in the vegetative propagation of Spruce and Douglas Fir. Grafting was unsuccessful in the greenhouse, owing to the development of rot fungi, but 95% success was obtained with grafts sheltered by cloches. Cuttings taken from young Spruce gave 50–75% rooting under glass. Douglas Fir was less successful, but 50% rooting was obtained in some cases. Rooting of Douglas Fir was improved by the use of synthetic growth substances which, however, gave no positive results with Spruce.

2943. Testi, G. D. Azione del nitrato di argento, del cloruro mercurico e di sali di zinco sul radicamento di talee di *Salix alba* L. [The effect of $AgNO_3$, $HgCl_2$ and $ZnSO_4$ on the rooting of cuttings of *S. alba*.] *Nuovo G. bot. ital* (*n.s.*) 57 (4), 1950 (1951), (656–7). [It.it.e.] A.P.B.

Immersion of cuttings in dilute solutions for periods of 12 hr. and upwards, stimulated root formation.

2944. Kobayashi, T. **Studies on planting Hiba (*Thujopsis dolabrata* Sieb. et Zucch.) in S. Hokkaido.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (94–6). [Jap.e.]

Establishment of Hiba in S. Hokkaido has so far been by natural regeneration after felling. The provision of plants grown from cuttings is recommended for the future. *From author's summary.*

2945. Miyajima, H. **Studies on the propagation of Hinoki (*Chamaecyparis obtusa* S. et Z.) by cuttings. 1st report. Effect of the age of the parent tree on the rooting of cuttings.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (71–3). [Jap.e.]

Results included the following: cuttings from young trees (2–3 years) grew more rapidly, started growth earlier, and rooted more readily than those from older trees (over 10 years). The shoot/root ratio was below 3 in the cuttings from young trees and over 3 in the cuttings from older trees. Graphs of height growth and survival each month for 5 types of cutting are presented.

2946. Kitsutaka, G., and Ōyama, N. **The relation between the season of taking cuttings and their failure to strike.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (76–8). 5 refs. [Jap.e.]

Experiments on rooting cuttings from 10 tree or shrub species at 25° ± 2° C. in soil containing 50% moisture, gave the following results: (1) The growth activity of the parent tree and cutting mortality % are closely related. Mortality is lowest in winter when the parent is dormant, rises during the spring and reaches its peak in May and June; it falls for a short period in August when growth of the parent stops temporarily, rises again in September, and declines steadily from October. (2) The mortality % tends to be lowest from November to January for deciduous trees while for *Myrica rubra* and *Acacia dealbata*, both evergreens, it is lowest in April and February respectively. *From authors' summary.*

2947. Sakaguti, K., and Yamaji, K. **Studies on vegetative propagation of trees, in particular on the relation between variations in plant constituents and survival of cuttings of Robinia.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (73–6). 11 refs. [Jap.e.]

An analysis of cuttings of *Robinia pseudoacacia* and *R. pseudoacacia* vars. *bessoniana* and *umbraculifera* during periods when rooting is easy (February–April) and difficult (June–July) showed that the N content of cuttings is high during the former period. Rooting is possible when the C/N ratio is below 100, only moderately good when it is between 30 and 40 (February–April) and difficult when it is between 150 and 400 (June–July). Results are shown in graphs. *From authors' summary.*

2948. Veen, B. Het vermeerderen van *Robinia pseudoacacia* L. [Propagation of *R. pseudoacacia*.] *Ned. Boschb.-Tijdschr.* 24 (1), 1952 (8–14). [Du.e.]

Further experiments [cf. *For. Abstr.* 13 (No. 271)] showed that best results were obtained from roots 10–12½ cm. long and 3 mm. minimum diameter. Inverted planting gave a lower rooting % and poorer plants. Cuttings ahould be made before growth starts in the spring. Storing plants and roots in a cool place in peat moss for 4–6 weeks did not reduce the rooting %. Results are tabulated.

2949. **Salai root-suckers experiment.** *Rep. For. Res. Madhya Pradesh 1949/50*, 1951 (3).

Experiments were made to discover the best time for applying treatment to roots of *Boswellia serrata* in order to obtain root suckers. The indications were that sprouting occurs only in June and July; that sprouts appear in not less than 15–30 days after wounding of the roots; that maximum height growth is obtained in sprouts obtained from trees of 18–24 in. g.b.h.; that poorest results are obtained from roots 1–2 in. in girth; that heaviest mortality occurs in sprouts from trees over 30 in. g.b.h., and that best sprouts come from trees 24–30 in g.b.h. and roots 2–3 in. in girth.

2950. Mattoon, H. G. **Air layering is easy and useful.** *Pa. For., Easton* 36 (349), 1951 (106, 121).

An account, with illustrations, of propagation by air layering or marcotting, using a transparent plastic covering to protect the rooting medium. Time required for root development, age of wood to which the method is applicable, and season for application, are given for a number of fruit, nut, or ornamental trees. Successful rooting of 3-year-old wood of Chinese Chestnut opens up the possibility of reducing the cost of clonal reproduction.

2951. Herrero, J. **Studies of compatible and incompatible graft combinations with special reference to hardy fruit trees.** *Repr.* from *Journal of Horticultural Science, London* 26 (3), 1951 (186–237 + 20 photos). 72 refs. X.

The problem of incompatibility between rootstock and scion in a range of plants is discussed and the literature reviewed. A study of compatible and incompatible grafts of Plums, Pears and Peaches is described. Studies on (1) time of bud-break, (2) initiation and basipetal spreading of cambial activity in spring, and (3) amount and time of shoot and trunk growth, did not suggest that these characteristics were directly associated with the primary causes of incompatibility between rootstock and scion. Differences in histological structure between the components of the grafted trees were found in many combinations, but were not correlated with the degree of compatibility of the varieties grafted. No effect of the scions was apparent on the structure of the rootstocks. The disturbance and even destruction of the cambial meristem at the graft union appeared to be responsible for a layer of undifferentiated tissue occurring between the stock and scion. In general this abnormality tended to appear at the end of the growing season and to occur with varying intensity at different points in the union. The probable effect of this undifferentiated layer of tissue on the mechanical strength of incompatible combinations and on translocation of nutrients is discussed. The suggestion is made that certain types of incompatibility may be dependent on factors residing in the tissues of stock and scion in contact with each other at the point of union, rather than on the interaction of particular leaf and root systems. *From author's summary.*

2952. WALTERS, C. S. **Figured Walnut propagated by grafting.** *J. For.* 49 (12), 1951 (917). [Illinois Agricultural Experiment Station.]

In 1929 scions from a Walnut [*Juglans nigra*] tree that had yielded highly figured logs, were grafted on native stocks. The grafted trees have now grown to pole size (7–8 in. d.b.h.) and when one of them was felled recently, its wood was found to have a distinct figure, more pronounced in the outer part than near the heart.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See also No. 2775.

2953. **Artificial regeneration.** *Rep. For. Adm. Malaya 1950*, 1951 (9–10).

Trials with soil blocks and small clay pots showed promise with some species, but seedlings quickly became pot-bound or grew out of the soil blocks and had to be planted out while still small, necessitating more frequent tending in the early stages. *Dryobalanops oblongifolia* wildings ca. 6 weeks old, transplanted into small clay pots, gave 76% survival after 5 months; survival in the field was 83–94% six months after planting out. *D. aromatica* wildings similarly treated gave 100% survival at 6 months. *Casuarina equisetifolia* and *C. sumatrana* raised in seed boxes and transplanted into soil blocks when ca. 2 in. tall, developed vigorously and suffered no check when planted out, whereas mortality of nursery-bed seedlings was heavy. Transplanting *Eucalyptus deglupta, E. saligna, E. robusta* and *E. alba* seedlings as soon as large enough to handle (1½–4 in. tall) into soil blocks has given excellent results, but as root development is extremely rapid, early planting out is necessary. Balsa developed very poorly and gave negligible survival in both small pots and soil blocks, but nursery-bed saplings 3–4 ft. tall, stripped of leaves and with roots trimmed to 9 in. long, gave 51% survival at 6 months.

Monthly plantings of both species of *Dryobalanops* were carried out. At a year from planting, wildings from 6–8 weeks up to 18–20 weeks old averaged over 80% survival. There was little difference in survival between notch-planted seedlings and those planted in small cultivated patches. Wildings of both species were sent in boxes, packed in moss, to various District Forest Officers and arrived in good condition, but survival was very variable. *Casuarina equisetifolia* wildings from east-coast beaches stood the 4-day journey to Kepong well, giving 80% survival.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 2906, 2966, 3003.

2954. ARNBORG, T. Om sådd- och planteringsmetoder. **[Methods of sowing and planting.]** *Norrlands SkogsvFörb. Tidskr.* 1950 (1), (27–38). 12 refs. [Sw.]

Discusses methods and equipment. [Cf. *For. Abstr.* 13 (No. 3539).]

2955. MORK, E. Forsøk med markberedning og såing i Ljørdalen statsskog. **[Experiments on screefing and sowing in Ljørdalen.]** *Medd. norske Skogsforsøksv.* 10 (2) (No. 36), 1949 (227–304). 17 refs. [Nor.e.]

Results of a series of experiments on typical Pine soil begun in 1934 are shown in graphs and tables and are discussed. Four methods were used for preparing the seed patches: (1) the humus layer was removed, and the mineral soil worked to a depth of 15 cm.; (2) as (1), but without the soil working; (3) the vegetation was removed and the humus mixed with the mineral soil to a depth of 10 cm.; (4) a narrow strip, 10 cm. × 1 m., was hoed to the depth of the mineral soil. The patches were examined at intervals, and the number of plants on them was counted; the final examination took place in 1946. Stocking was best on patches prepared by method (1), followed in order by (2), (3) and (4), both when the patches were sown by hand and when left to natural seedfall. The cultivation expenses show that the approximate cost of obtaining 3,000 plant-bearing patches per ha. after a period of 12 years, by method (2), will be Kr. 92 as against Kr. 120 by other methods. Method (1) is too expensive for practical use. The number of seed patches made per working hour by methods (1), (2), (3) and (4) was 47, 92, 71 and 123 respectively. With method (2) it is better to cover the seeds thinly with soil. Conditions for natural regeneration were poor, giving only 5,000 seedlings per ha. outside the seed patches; these plants were very irregularly spaced. Sowing the seed patches will be only slightly more expensive, because fewer patches will be needed. Seed trees should be left even when patches are sown, in case of frost lift or drought. Grazing damage in Ljørdalen is severe, and 42% of the plants were damaged. Costs of up to Kr. 400/ha. for

artificial regeneration in Ljørdalen are considered economically sound; at a rate of Kr. 2/hr. the cost of screefing and sowing by method (2) will not exceed Kr. 230/ha., half of which will be refunded by the State. [Cf. *For. Abstr.* 11 (Nos. 245–7).]

2956. **[*Barringtonia acutangula* regeneration].** *Rep. For. Res. W. Bengal 1949/50*, 1951 (11).

Seeds which, in nature, may not germinate until September–October when the water subsides and deposits them on the muddy soil, can be successfully sown direct in wet areas just after collection, in June and July. Seedlings up to 6 in. high can be ball-planted in muddy soil during the rains.

2957. **[Direct sowing of Mahogany.]** *Rep. For. Adm. Malaya 1950*, 1951 (10).

Tested seed of *Swietenia macrophylla* of 96% germinative capacity was sown in *belukar* (secondary jungle) at 15 × 12 ft. spacing with 2 seeds at each spot, over 2 areas totalling 3 acres. Early results were most promising but after 3 months all had died. Damping off seemed to be the main cause, but some casualties were due to black ants eating through the seed coat and consuming the cotyledons after germination.

2958. KORMILICIN, A. M. Gnezdovye posevy fistaški v Tadžikistane. [**Nest sowings of *Pistacia* in Tadzhikistan.**] *Lesn. Hoz.* 3 (10), 1950 (58–9). [Russ.]

Although *Pistacia* [*vera*?] woodland occurs on some 200,000 ha. in the republic, only 70–80,000 ha. remain when very open stands are disregarded. The most valuable stands occur in the south at 700–1600 m. altitude, with an annual rainfall of 350–500 mm. It should be possible to harvest 1500–2000 tons of nuts from accessible areas in good seed years, but the actual amount collected is not more than 1000 tons. The soils on which *Pistacia* is found are chiefly dark serozems with a relatively high Ca content, which is favourable to the growth and fruiting of this species. The Ministry of Forests has sown increasing areas of state forest land with *Pistacia*, and the Forest Experiment Station has been studying the possibilities of nest sowing. As long ago as 1934, (1) patch and (2) line sowings were made on the foothills of the Hissar Mountains near Stalinabad. In (1), the 1-m. patches were spaced at 4–5 m. centres in the rows with 6·5 m. between rows (330 patches/ha.), the result in 1949 being on an average 886 large bushes per ha. In (2) [original spacing not given] the lines were 6 m. apart, and in 1949 the bushes averaged 90–100 cm. apart in the lines. The 1949 inspection showed that mean heights and diameters at 1 m. were respectively 263 cm. and 2·1 cm. for (1), and 212 cm. and 1·4 cm. for (2). In (1), both height and diameter growth increased with increasing number (from 1 to 8) of bushes per nest. Notes are also included on a trial begun in 1948 using 710 one-metre 'nests' per ha., each sown with 50 seeds (germinative capacity 85%) in a chequerboard arrangement. No auxiliary species were used. The area was completely ploughed in 1948 and reploughed in 1-m. strips in spring 1949 before sowing. By the end of the first growing season the nests contained an average of 30 well developed seedlings 12–15 cm. tall. About 25% of the seedlings perished during a drought period: these seedlings had root systems 30–40 cm. long as compared with 50–60 cm. for those that survived. No fungus or insect damage was detected, and the deaths are ascribed to moisture deficiency at the 30–40 cm. level in the soil. In spring 1950 the seedlings had roots 160–170 cm. and shoots 10–12 cm. long. It is inferred that 25–30 seeds per 'nest' should be sufficient, preferably sown by Lysenko's method in several spots within each 'nest'.

2959. PURVINJ, P. I. Lesnaja sejalka. [**A forest sowing machine.**] *Lesn. Hoz.* 3 (9), 1950 (77–8). [Russ.]

Describes, with diagrams, a 1-horse, plough-type seed driller designed by the author for conifer sowings. Its essential features are: (1) an adjustable wheel in front, for regulating the depth of furrow; followed by (2) a coulter curved in such a manner that it cuts fine roots but slides over larger ones and simultaneously lifts the ploughshare clear of the obstacle; (3) a ploughshare with a seed hopper, mounted between its short double mouldboards; and (4) a small roller for firming the soil. The seed hopper has a spring plunger, operated by a string from the right plough-handle, with a screw for regulating the amount of seed released. The machine cuts a 20-cm. furrow and can also be used, if desired, for soil scarification to aid natural regeneration.

232.4. Formation of Stands by Planting

See also Nos. 2894, 2954.

232.41. *Planting Stock (Type, Handling and Treatment)*

See also Nos. 2953, 2956.

2960. BALDWIN, H. I., and PLEASONTON, A. **Cold storage of nursery stock.** *Fox For. Notes* No. 48, 1952. pp. 2.

Experiments were made with 3-year-old seedlings of *Pinus strobus*, *P. resinosa*, *Picea glauca* and *Abies balsamea*. Roots were surrounded by damp sphagnum moss and covered with heavy waxed paper, and bundles of 50 were packed upright in open cartons. Highest survival in all species was obtained at temperatures just above freezing. Spring storage gave better survival than autumn storage. Quick-freezing and low-temperature (0°–10° F.) storage resulted in total loss. *P. strobus* withstood storage best, followed by *Picea glauca*, *Pinus resinosa* and *A. balsamea*, in that order. *P. strobus* and, to a less extent, *Picea glauca* stored at ca. 35° F. survived well when planted as late as June and July.

232.43. *Spacing and Arrangement in Plantations*

See also Nos. 2973, 2977.

2961. LAUFFENBURGER. **Densité des plantations de pins sylvestres en vue de la production des bois de qualité. [The spacing of Scots Pine plantations for the production of quality timber.]** *Rev. for. franç.* 1952 (1), (41–54 + 1 photo). [F.]

From observations made in a number of plantations in the Vosges, the author concludes that in order to produce Pine sawtimber in that region, an

initial density of 20,000–30,000/ha. is advisable, followed by a heavy and economically profitable thinning (30 cu.m. of mine timber/ha.) at 35 years. At this stage, the plantation should be underplanted with Beech.

232.5. Artificial Formation of Stands by Vegetative Propagation

2962. [**Vegetative propagation of *Salix tetrasperma*.**] *Rep. For. Res. W. Bengal 1949/50*, 1951 (11).

Branch cuttings of *S. tetrasperma* were planted in waterlogged areas towards the end of May. The most successful cuttings were 1 in. in diameter, 1 ft. long, with both ends cut at an angle of 30–45°.

233. *Afforestation*

See also Nos. 2724–5, 2883, 2894, 2905, 2980, 3255.

2963. BALSAY, L. A Hanság mint erdöterület. [**The Hanság as a potential forest area.**] *Erdész. Lap.* 86 (6), 1950 (168–73). [Hung.russ.f.e.]

The Hanság, the most low-lying part of the Small Hungarian Plain (Kisalföld) covers 100,000 cadastral *hold*, of which a tenth is already forest and about a fifth is under cultivation. The soil is particularly suitable for quick-growing trees, and with irrigation these, including Poplar and Alder, could attain to six times their average growth in Hungary. A cross-section of the soil shows: (1) Humus, 15–50 cm. deep; (2) peat, 5–150 cm. deep; (3) a gley-like bluish-grey clay; (4) alternating layers of gravel and sand. Between (2) and (3) there is sometimes a 3- to 5-cm. layer of bituminous soil and the clay is turned black from the overlying peat.

The Hanság varies between 113 and 117 m. above sea level. Yet even this small variation creates problems. So far there has been no cultivation (grass or forest) at 113–114 m., because at this level flooding occurs even after the spring rise in temperature. Drainage channels would be essential. The area represents 10% of the Hanság.

At 114–115 m. (an area representing 50% of the Hanság) the water recedes in April, and the ground can readily be irrigated in drought. The watertable can be maintained at 60 cm., so that these levels are best suited to quick-growing soft woods. At 115–116 m. (30% of the total) there is no flooding. The soil is still moist and suitable for planting all species that grow on the plains. At 116–117 m. (10% of the total) the soil is dry, consisting of loose silt which retains moisture poorly.

On the Hanság a difference of even a few tenths of a metre may be important. Thus White and Black Poplar have established themselves in clearly separate groups, the former above 114·3 m., the latter just below.

The humus is inflammable, and fire can consume the whole layer, leaving 5–10 cm. of ash. In 1947, however, two years after such a fire, wind-borne Poplar seeds from the nearby Madárerdö (Forest of Birds) were found to have germinated in the burnt soil, while reed roots which had lain dormant in it for centuries [*sic*] began to sprout. The latter were cut to free the Poplar seedlings (Black, more rarely White).

Few areas show more rapid changes than the 'Alder forests' of the Hanság. These Alder stands are not indigenous to their present sites; 80% have been planted since the 1880s, when cultivation of Alder was intensified and spread away from the original sites. During this period Alder was exclusively cultivated, and water was both supplied and drained off to excess. In the 1920s a new phase began, when the stagnant water was drained off late into the spring, but in dry seasons a shortage of water resulted. Intensive irrigation was started and new species were planted, including Poplar and Robinia. Further changes are now due if the Hanság is to play its full part in Hungarian forest economy.

In the 'Alder forests' 100,000 m. of channels and ditches supply river water. Excess water can be drained off and the watertable can be regulated to a centimetre at altitudes of 114–115 m. The loose marshy soil and the underlying peat allow the water to move at the rate of 100 m. a day. The irrigation ditches at present are 1000 m. apart; but since growth alongside them can be 10 m. high while that 200 m. away is only 3 m. high, ditches at closer intervals are clearly called for.

Below 114 m. the spring level of water recedes late. But to accelerate this process by draining would be dangerous for growth on the higher levels. It is better to raise the lower levels by planting on ridges built up 30–40 cm. The cultivator in use at present breaks up the peat layer but does not bring up the underlying clay. Nevertheless it is possible to ensure that the roots penetrate between the broken turves of peat to the clay, which is thus to some extent aerated.

At levels about or below 114 m. the soil needs treating as above. The ridges are planted with Black or 'Canadian' Poplar plants (or long cuttings) mixed with Alder, Elm and Maple, at the rate of 3000/*hold.* White Willow cuttings are set between the rows for quick cover and also provide excellent withies. No soil cultivation is done at this level.

At 114–115 m. also, soil cultivation will prove worth while, but the work has not yet been completed. Here, there are 2–3 years of intensive clearing of the man-high jungle of coarse weeds (nettle, hemlock etc.) to be done, along with the re-establishment of the former grass cover, which offers a more suitable environment for the plants—2 years old, 1 m. high—and allows them freedom until in 2–3 years they can themselves suppress the grass. Trees treated in this way repay the time lost in re-grassing at felling. Under pure Alder the weeds re-establish themselves all too quickly.

Above 115 m., planting is done only on areas subject to ordinary cultivation for 1–2 years followed by 2–3 years intercropping. Poplar, Oak, American Walnut and Robinia are used. *Taxodium*, *Quercus palustris*, *Sophora*, *Q. rubra* and *Pinus sylvestris* have been tried with good results, but data to hand so far are meagre.

Below 114 m., because of the constant high water level, there is a broad and shallow surface root

development (4 m. in diameter for an Alder 1·5 m. high), aerial roots develop on trees that have long stood in water, and windthrow is common.

Between 114 and 115 m. (the level that causes most problems) the roots can penetrate the humus only as far as the peat layer (30–60 cm.). The peat is nutritionally neutral, but it is a bad thing in drought and the roots, being unable to penetrate, form a flat disc 30–60 cm. thick and up to 10 m. in diameter, so that the trees are easily uprooted by wind.

Above 115 m. there is no physical impediment to planting. As to Alder, it is to be noted that although there are some fine young and middle-aged stands, few well developed old stands are to be found. At the time of planting it may, in the circumstances, have been the only possible choice; but more suitable species must be found to-day.

2964. Ustinovskaja, L. T. Proizvoditeljnostj dubovyh nasaždenij v dolinah stepnyh rek Ukrainy. **[The productivity of Oak woods in the river valleys of the Ukrainian steppe.]** *Lesn. Hoz.* 3 (10), 1950 (53–7). [Russ.]

The valley lands of the numerous rivers flowing through the steppe, offer the most favourable conditions in the region for forest growth. The predominating soils are light clay-loams, sandy loams, and sands which cover buried soils having a high moisture capacity and nutrient content, located at no great depth under the sands. The long, warm growing season is also a favourable factor. At present, however, much of this land is treeless and there are large semi-desert areas used as poor pasture. The effects of unregulated grazing and lack of forest cover are seen in soil blowing and silting of the stream beds, many of which dry up in summer. Various examples are quoted of natural woods and plantations of Oak in these valleys, with tabulated mensurational data to show that high yields of quality timber are attainable, and it is urged that large-scale afforestation should be undertaken to create stands that should combine the functions of protection and production forest.

2965. Florovskiĭ, A. M. Racionalizacija lesnogo hozjaĭstva v plavnjah Nižnego Dnepra. **[Rationalization of forestry on the floodplain of the Lower Dnieper.]** *Lesn. Hoz.* 3 (8), 1950 (44–5). 1 ref. [Russ.]

The Lower Dnieper floodplain from Zaporozhe to the river's mouth, covers ca. 275,000 ha. which are under water every year for 15 to 60 days. Its soils vary from coarse-textured alluvial deposits adjacent to the river, to lower-lying sandy or light clay loams towards the middle of the plain, where there are many lakes and watercourses and the soils are marshy or peaty. From the middle to the outer river terraces the soils are clay-loam meadow types with local salinity. Only 20% is wooded, and most of this has an annual increment of only 3–3·5 cu.m./ha., being of coppice origin. Planted forest (18% of the wooded area) is more productive. The chief dominants are *Populus nigra* and *Salix* [*fragilis*?], which have an m.a.i., in closed stands, of 10–15 cu.m./ha. Only a small area of the most productive land is at present used agriculturally. In the author's view, a network of 50 m.-wide shelterbelts should be established, which would retard the current of flood water, cause deposition of coarse alluvium in the belts, and give more even distribution of the finer material between them. Such belts should occupy about 35,000 ha. The poorer sandy and boggy sites should be afforested. Species recommended are: (1) for dunes—*Pinus sylvestris* and *P. pallasiana* [cf. *For. Abstr.* 13 (No. 2883)], with *Juniperus sabina* and *Caragana arborescens*; (2) sandbanks with the spaces between them—*Populus nigra*, *P.* '*canadensis*' and *P. balsamifera*; (3) saline clay-loams (mineral salt content 0·3–0·9%)—'Turkestan Poplar' [*Populus* Sect. *Turanga*?] and *Populus alba*; (4) fresh sandy to light clay loams of central zone—as (2), plus *Salix* [*fragilis*?] and *Ulmus* [*effusa*?]; (5) moister variants of (4)—*Populus nigra*, and *Alnus glutinosa* along streams; underwood of *Ribes nigrum*; (6) fresh clay-loams near terraces—*Quercus robur*, *Fraxinus pennsylvanica*, *Populus nigra*, *P.* '*canadensis*'; underwood of *Euonymus*; (7) moist clay-loams near terraces—as (6), plus *Salix* [*fragilis*?] and for second storey, *Ulmus* [*effusa*?]; (8) boggy peat soils—*Salix* [*fragilis*?].

2966. Lazarevič, I. I., and Krutikov, L. P. Aèrosev v peskah Srednei Azii. **[Aerial sowing on the Central Asian sands.]** *Lesn. Hoz.* 3 (10), 1950 (34–43). [Russ.]

Work on sand fixation in the Kizil Kum near Bokhara was begun in 1925–6, various species of psammophytic trees and shrubs being planted and protected with screens [of brushwood?]. The work was very difficult and costly. In the winter of 1933–4 the first aerial sowing trials were made, using 'Black Saksaul' [*Haloxylon aphyllum*], on an area of 300 ha., which is now thickly covered with a stand having a density of almost 1·0. Aerial sowings were then abandoned because the seed, which was not de-winged, did not flow smoothly through the apparatus and was so bulky for its weight that frequent reloading was necessary, and only 8–10 ha. could be sown per hour within a radius of 5–8 km. from the airfield. From 1942 to 1950 some 25–26,000 ha. were sown by hand broadcasting. Meanwhile a special de-winging and cleaning machine, the UO–2, was devised by the Central Asian Forest Research Institute, and aerial sowings were re-started, about 500 ha. being sown experimentally with various species in 1948–9, and 1150 ha. with Saksaul in spring 1950. The de-winging machine, which takes its drive from a horticultural tractor, is described in some detail, with sectional drawings, a photo, and tabulated data on its performance in de-winging and cleaning Saksaul seed and cleaning seed of *Salsola* sp. With 4 workmen (3 on the machine and a tractor operator) the output of Saksaul seed was 6500 kg. in 7 days at a cost of Roubles 93·5/1000 kg. The spreading apparatus used in the aircraft is also described and illustrated with sectional drawings, and some account is given of the results of trials which showed that at the best flying height, viz. 20 m., a swath averaging 20 m. wide could be satisfactorily sown, if the wind did not exceed 5 m./sec. In conclusion, notes are given on the areas sown and on sowing technique as developed during 3 years' experience. Sowings in early March gave an

average number of seedlings/ha., on 1 May, of 2490 compared with 2530 for broadcasting by hand; on this date the shoot length averaged 5–6 cm. for both aerial and ground sowings. These sowings were actually later than is desirable, the best time being late December to mid-February, when adequate moisture is available from snow and rain. Good results were obtained by sowing in fine rain or on the surface of snow. The area of 1150 ha. was sown with 2771 kg. of de-winged Saksaul seed in a total time of ca. 25 hours, including flying to the sowing areas and refuelling. Costs per ha. are estimated to be Roubles 3·18 less than for broadcasting by hand.

2967. ROGERS, N. F. **Strip-mined lands of the Western Interior Coal Province.** *Res. Bull. Mo. agric. Exp. Sta.* No. 475, 1951. pp. 55. 8 refs.

A survey of the strip-mined lands, their extent, location, and present condition, with lists of vegetation and some account of afforestation projects, and of the more serious pests of trees in such plantations. [Cf. *For. Abstr.* 13 (No. 2975).]

2968. POTTER, H. S., WEITZMAN, S., and TRIMBLE, G. R., JR. **Reforestation of strip-mined lands in West Virginia.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 43, 1951. pp. 28. 19 refs.

Studies were made on a number of spoil sites. As a result, recommendations are made on planting stock, methods, season and spacing and on species arrangement and distribution. Red, Pitch, Jack and Virginia Pines, Black Locust, Yellow Poplar [*Liriodendron tulipifera*], Red Maple and Sycamore [*Platanus occidentalis*] are suitable for spoil-planting where soil pH is 4·0 or higher. Some other species are suggested for field trials.

2969. LIMSTROM, G. A., and DEITSCHMAN, G. H. **Reclaiming Illinois strip coal lands by forest planting.** *Bull. Ill. agric. Exp. Sta.* No. 547, 1951. pp. 251. 19 refs.

Recommends species suitable for planting on different types of spoil. *Liriodendron tulipifera* is the most exacting of the species tried. Robinia was found to be a good nurse to *Juglans nigra*, *Acer saccharinum* and *L. tulipifera*, but was unfavourable to *Populus deltoides*, *Liquidambar styraciflua* and *Maclura pomifera*. Since the greatest mortality in plantings seems to occur in the first year, a fair estimate of future stocking can often be obtained from second-year examination. Robinia, because of its sensitivity to site conditions, is a good indicator of site quality: after 2 growing seasons trees of this species ranged from an average of 2·3 ft. in one area to 8·8 ft. in another. Operations which remove the overburden in two stages generally left the spoils in better condition for tree growth than one-stage removal.

2970. MINCKLER, L. S. **Comparative success of conifers and hardwoods planted on two old-field sites in southern Illinois.** *Sta. Note Cent. St. For. Exp. Sta.* No. 67, 1952. pp. 2. 1 ref.

Five-year height growth of 7 species on a slightly eroded and a severely eroded site, shows that hardwoods are not suitable for such sites. Softwood plantations are promising. Survival of all species was good.

2971. REHMAN, A. **Pail experimental plot.** *Pakistan J. For.* 1 (4), 1951 (348–52 + map).

Describes an attempt (1948) to reduce erosion on a heavily grazed waste, without excluding livestock. Measures taken included contour bunding, gully plugging and sowing *Zizyphus*, *Acacia* and other species. Some improvement was effected. It is proposed to sow *Prosopis* instead of *Acacia* in future as being more unpalatable and persistent.

2972. DASEN, E. Verbauung und Aufforstung der Brienzer Wildbäche. [**Engineering works and afforestation in training operations on mountain torrents near Brienz.**] *Veröffentlichungen über Verbauungen, Eidg. Departement des Innern, Inspektion für Forstwesen, Jagd und Fischerei* No. 5, 1951. pp. 66 + 10 plates + 1 tbl. + 1 map. 33 refs. [G.f.] Obtainable from the Sekretariat der Eidg. Inspektion für Forstwesen, Jagd und Fischerei, Bern, Price *Fr.*3.

2973. HORVAT, A. O gustoći sadnje na degradiranom kršu napose za alepski bor. [**Planting distance on denuded karst, particularly for *Pinus halepensis*.**] *Šum. List.* 75 (8/10), 1951 (286–96). 36 refs. [Croat.f.]

Includes a comprehensive survey of previous work on this subject (mostly local), with a detailed discussion. Various authors give figures ranging from 2500 to 24,400/ha. as a suitable initial density, irrespective of species. The role of *Pinus halepensis* as a soil-protecting species is particularly discussed. The author distinguishes 5 classes of karst soils, the average being the 2nd-class soil to which all further study refers. He argues for a high initial density as ultimately conducive to moisture conservation, and presents an analysis of density and % canopy cover afforded by *P. halepensis* in selected experimental plots of natural stands ranging from 5 to 55 years old. The rounding of the crowns of *P. halepensis* begins here at the age of 17–20, i.e. when the peak of height increment is reached. It is calculated from the data available that, for this range of ages, the initial number of stems to give 100% crown density would be 7500–6500/ha., and these figures are accepted as the optima. To use more plants would mean waste, as most of the natural elimination takes place before the age of 17. For economy the lower figure is adopted, equivalent to a planting distance of 1·25 m. in square spacing. These findings have been confirmed by a survey of two plantations (at Osejava and Cvitaška).

2974. MIGUET. Le reboisement de la Réunion. [**The reforestation of Réunion.**] *Rev. for. franç.* 1952 (2), (87–98 + 3 photos, 1 map). [F.]

An account of the forests of Réunion, their degradation, and measures already begun and suggested for their restoration.

234. *Formation of Forest by Natural Succession*

2975. MERZ, R. W., and PLASS, W. T. **Natural forestation on a strip-mined area in Ohio.** *Sta. Note Cent. St. For. Exp. Sta.* No. 68, 1952. pp. 2.

A survey in 1951 on land mined in 1949 was made by counting naturally established seedlings on 200 milliacre plots. On the north aspect 93% and on the south aspect 65% of the plots contained one or more seedlings. The species were mainly Sycamore [*Platanus occidentalis*], Hard Maple, Elm, Yellow Poplar [*Liriodendron tulipifera*] and White Oak. [Cf. *For. Abstr.* 13 (Nos. 2967–9).]

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 2896, 2957, 2998, 3000.

2976. ŠAFAR, J. Ugib..nje i obnavljanje jele u prebornim šumama Gorskog Kotara. [**The dying-out and regeneration of [Silver] Fir in the selection forests of the Gorski Kotar.**] *Šum. List* 75 (8/10), 1951 (299–303). [Croat.g.]

The author recommends for the regeneration of *Abies alba* in the region of the *Fagetum abietosum* the introduction of thermophilic species (*Ostrya carpinifolia* and *Fraxinus ornus*), after which Fir and Beech will come in naturally.

2977. MOULD, R. C. L. **An attempt at an 'ideal'.** *Quart. J. For.* 46 (1), 1952 (53–4).

Describes an experimental mixture of Oak and European Larch planted in 1935 at 5-ft. square spacing with Oak only at the corners of each block of 25 plants. Instead of planting an Oak transplant, however, 1 sq. ft. was dug over and into the prepared ground were dibbled 16 one-year Oak seedlings 3 in. apart. These clumps of Oak were therefore 20 ft. apart with 3 Larch at 5 ft. apart between them. For 7 years after planting, the Oak patches were hoed 3 times a year, and in 1942, when they were 8–10 ft. high, all but the one best Oak in each clump were dug up and re-planted in a neighbouring wood among hybrid Larch. At 16 years of age the first plantation formed an excellent crop with good, straight-stemmed Oak 22–25 ft. high, overtopping the European Larch 18–20 ft. high. In the second plantation, survival was good, but some of the transplanted Oaks needed pruning. The cost of preparing the ground, supplying and dibbling in 16 one-year seedlings is little if any more than that of supplying and planting one Oak transplant 18–24 in. high. [Cf. *For. Abstr.* 13 (No. 2906).]

2978. FORTUNATOV, N. I. Kuljtury sosny s dubom. [**Plantations of [mixed] Pine and Oak.**] *Lesn. Hoz.* 3 (9), 1950 (58–9). [Russ.]

Gives an example to illustrate the fact that Oak fails to form satisfactory stands when planted in 6-row strips alternating with 12-row strips of Pine on Pine sites of a heath-like type in the Ukraine.

2979. LONČAR, I. Uzgoj bagrema u svrhu povećanja proizvodnje rudničkog drveta. [**Growing of *Robinia pseudoacacia* to increase the production of mining timber.**] *Šum. List* 75 (7), 1951 (250–4). 5 refs. [Croat.e.]

In Jugoslavia *R. pseudoacacia*, in single trees or groups, forms a subsidiary species in Beech, Hornbeam, or Oak stands. The author recommends growing it on a large scale, in mixture with shade-bearing species (Beech, Hornbeam, Lime, and Maples), as a source of pitprops.

237. *Amelioration of Forest Sites*

See also Nos. 2731, 3053, 3058.

2980. MALMSTRÖM, C. Om torvmarkers nyttiggörande för skogsproduktion. [**The utilization of peat soils for timber production.**] *Norrlands Skogsv-Förb. Tidskr.* 1950 (1), (15–26). [Sw.]

Discusses the effect of the thickness of the peat layer, of the chemistry of the site and of soil carried down by streams draining into the area, on the suitability of peat sites for drainage for afforestation, with or without the addition of fertilizers. Gives rough figures showing the areas in Sweden already drained and those undrained but suitable for drainage. Discusses draining techniques using hand labour, mechanical means or explosives.

2981. K., T. Skotter og skandinaver. I. Skotteturen. II. Nordisk Skogunion. [**Scots and Scandinavians. I. A tour of Norway by the Royal Scottish Forestry Society. II. The Scandinavian Forest Union.**] *Tidsskr. Skogbr.* 59 (10), 1951 (327–33). [Nor.]

Includes a brief account of manuring experiments on Krokbekmoen among 70-year-old Pine on a sandy heath site 210 m. above sea level. In 1945, plots were manured with complete fertilizer or $Ca(NO_3)_2$, or were left unmanured. From 10 to 40 kg. of fertilizer were used per dekare. Results so far are good: increment has very much increased; needles are larger and greener; there are large numbers of cones; and during the last 2–3 years abundant natural regeneration has appeared on the manured plots. It will be some years before adequate figures are available for the publication of detailed results. Large-scale experiments were begun in 1950.

2982. **Nutritional studies.** *Rep. N.Z. For. Serv. 1950/51*, 1951 (27).

Trial plots laid down to study the effects of treating naturally regenerated *Pinus radiata* with trace elements (Mn, Cu, Zn and B) have been re-examined and the data analysed. Treatment with $ZnSO_4$ has clearly produced a significant increase in growth. It is proposed to establish a more critical series of plots.

24. TENDING OF STANDS AND TREES

See also No. 3539.

242. *Thinnings*

See also Nos. 3224, 3275.

2983. KÜNANZ, H. Zwischen schwacher und starker Durchforstung: eine historisch-kritische Betrachtung von gegenwärtiger Bedeutung. [**Between light and heavy thinning: a critical historical study of current importance.**] J. D. Sauerländer's Verlag, Frankfurt a.M. [1949.] pp. vii + 94. [G.g.] (*Suppl.* to *Allg. Forst- u. Jagdztg.* 1949).

2984. HUMMEL, F. C. **An experiment on the sampling of early thinnings.** *Forestry* 25 (1), 1952

(19–31). 2 refs. [Forestry Commission Research Station, Alice Holt.]

Several subjective and objective methods of sampling the average volume per tree in first and second thinnings were tested in stands of Sitka Spruce, Norway Spruce, Scots Pine, Corsican Pine, Douglas Fir, and European Larch. Altogether 7000 thinnings were measured at Fernworthy in Devon, Thetford Chase in Norfolk, the Forest of Ae in Dumfriesshire, and Kinellar in Aberdeenshire. The subjective methods, consisting of visual estimates and the measurement of groups of trees selected as appearing representative, tended to give biased results no more precise than those obtained by the objective methods, which are unbiased. The objective methods tested were random groups, systematic sampling by trees, and systematic sampling by rows. The last proved the most satisfactory in combining a reasonable degree of precision with simplicity in execution. *From author's summary.*

2985. HILEY, W. E. **Numerical thinning: with special reference to Japanese Larch.** *Forestry* 25 (1), 1952 (10–8 + 2 photos). 13 refs. [Woodlands Research Department, Dartington Hall Trustees, Totnes, S. Devon.]

A distinction is drawn between qualitative and quantitative (numerical) methods of describing and specifying thinnings. It is urged that foresters should learn to use numerical specifications and should acquire the technique of thinning to any desired number of trees per acre. If the numbers of trees are plotted against height or age, a thinning grade can be represented by a graph. A series of such graphs derived from comparable yield tables for Norway Spruce show that at a height of 70 feet Schwappach recommends the retention of more than three times as many trees to the acre as Møller does. Owing to its intolerance of lateral suppression, Japanese Larch requires heavy and early thinning, and appropriate thinnings for this tree look quite unorthodox. Graphs representing published thinning grades for this tree are reproduced and a provisional thinning specification is presented for Dartington, South Devon, where the average quality class is super-first of Hummel's yield table. *From author's summary.*

2986. CAMPBELL, SIR G. I. **Some observations on the experience of an amateur with special reference to thinning in an area of rapid growth.** *Scot. For.* 6 (1), 1952 (3–9).

Urges the need for severe early thinning, coupled with pruning, of Sitka Spruce on the West Coast of Scotland in order to take full advantage of the remarkable growth potential.

2987. JACOB, G. **Extraction and utilisation of softwood thinnings** [in Great Britain]. *J. Oxf. Univ. For. Soc.* (*Ser. 3*) No. 6, 1952 (49–56).

Cf. *For. Abstr.* 13 (No. 3275).

2988. SCOTT, C. W. **The properties and uses of conifer thinnings in Great Britain.** *Forestry* 25 (1), 1952 (1–9). 10 refs. [Forest Products Research Laboratory, Princes Risborough.]

The paper, read at the British Association meeting at Edinburgh in August 1951, considers shortly the evidence on the suitability of home-grown conifer thinnings as pitprops. Two examples of other good uses for conifer thinnings are cited, one in the Forestry Commission's new forest in East Anglia and one by private enterprise near Chester. Figures are given to show the very considerable quantities of conifer thinnings available in 1951 and likely to be available in 1961. The effect of rapid growth and pruning on conifer wood quality and use is discussed and the writer's opinion recorded that as high-quality timber as possible should be aimed at. Too much reliance should not be placed on increases in chemical and pulping developments where knots may be unimportant. In sawn timber knots are often a critical factor. *Author's summary.*

2989. ARNBORG, T. Om samspelet mellan mark och produktion. [**The relationship between soil and production.**] *Norrlands SkogsvFörb. Tidskr.* 1950 (4), (399–422). 17 refs. [Sw.e.]

A study of soil, ground cover and tree growth on sample plots in Pine stands, shows that in N. Sweden heavy thinnings reduce soil moisture, raise soil temperature, reduce the quantity of *Polytrichum* and *Vaccinium* and favour higher timber yield.

2990. GAINES, E. M. **Growth after thinning young Longleaf Pine.** *Sth. Lumberm.* 183 (2297), 1951 (168–70).

Cf. *For. Abstr.* 13 (No. 2133).

2991. MILLER, W. D. **Thinning in old-field Virginia Pine.** *J. For.* 49 (12), 1951 (884–7).

Thinning experiments have been conducted in old-field *Pinus virginiana* stands in N. Carolina since 1932. The thinned stands were 5–37 years old and the densities of the younger stands ranged from 4000 to 9000 stems/acre at the time of thinning. These studies showed that in the N. Carolina Piedmont, thinning of Virginia Pine 12 years or older is not practical, because of poor growth response and the danger of damage from wind and from glaze frost. Thinning of stands 5–6 years old, however, resulted in accelerated growth without glaze damage.

243. *Opening of the Canopy* (*Increment, Overhead Release and Improvement Fellings*)

See also Nos. 3021, 3260.

2992. REYNOLDS, R. R. **Improvement cutting in Shortleaf and Loblolly Pine.** *Sth. Lumberm.* 183 (2297), 1951 (237–9).

In several studies at the Crossett Experimental Forest, Pine growth increased substantially after low-grade hardwoods had been removed.

2993. TERAZAKI, Y., and NISHIDA, K. **Report on the 'Sugi' improvement felling. (1st report.)** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (65–7). 2 refs. [Jap.e.]

Data for this mixed conifer and hardwood forest, with Sugi (*Cryptomeria japonica*) as its chief species,

are tabulated to show volume removed and residual stand, by 3 diameter classes, at each of 4 improvement fellings between 1925 and 1948. The beneficial effects of such fellings on the growth, value and yield are discussed.

2994. ASSMANN, E. **Seebachbetrieb und neuzeitlicher Lichtwuchsbetrieb. [The light increment felling system of Seebach and the modern open-stand system.]** *Forstwiss. Cbl.* 68 (3), 1949 (129–51). [G.]

Describes the evolution of Seebach's system and discusses the development of the Solling stands in which the system was first practised. Definitions of silvicultural operations for Beech are presented as follows: *I. Thinnings:* The basal area of the stand is not brought below the 'critical' level. *II. Light increment felling:* The basal area of the stand is reduced below the 'critical' level, i.é. within a decade 10% or more of stand increment is sacrificed—(1) in one-storeyed high forest: the 'classical' system of Seebach; (2) in two-storeyed high forest. *III. Open-stand system:* Aims at producing quick increment on the best stems, with a minimum of silvicultural disadvantages. Two forms of this system are recognized, one with and one without regeneration from advance growth providing ground cover.

These operations are discussed and some general principles laid down for open-stand treatment of Beech. Considering the state of the Beech stands in Germany and the present demand for timber, the author believes that it would be advisable to concentrate on the open-stand system, the 'classic' system of Seebach or upon the system of high forest with standards (II (2), with emphasis on the lower storey), all of which, while providing wood for present needs, conserve some of the best stems to provide future high-grade timber. [Cf. *For. Abstr.* 7 (No. 1787).]

2995. READ, R. A. **Stand improvement in upland hardwoods.** *Sth. Lumberm.* 183 (2297), 1951 (163–5).

Improvement fellings made on 60,000 acres of hardwood and Pine stands in the Sylamore district of the Ozarks in 1934–5, largely combined two types of treatment: (1) releasing the understorey by felling or girdling overstorey culls and wolf trees; (2) cleaning or weeding the understorey to assist saplings of desirable form, chiefly of White Oak, Shortleaf Pine, Red Oak, White Ash and Black Walnut, at an average spacing of 17 × 17 ft. Fewer trees were removed in stands containing Shortleaf Pine; these occurred chiefly on southern and western slopes on which fire had consumed the litter and there was danger of erosion. The stands were examined in 1950. The understorey in treated stands now averages 37·6 sq. ft. basal area/acre against 24·5 in untreated stands. Saplings released in 1935 are now strikingly larger in diameter than their neighbours. In treated hardwood stands, overstorey is sparse and is composed mainly of mature White Oaks; the basal area of the overstorey averages 27·9 sq. ft./acre, only 5·7 sq. ft. being cull trees. In untreated hardwood stands, the overstorey is composed of White, Red and Black Oaks, Hickory and Black Gum. The basal area is 66·3 sq. ft., of which 22·4 sq. ft. is cull. The understorey remains suppressed and unthrifty. Results in Shortleaf Pine stands are less good: not enough hardwoods were cut to allow widespread Pine reproduction. Improved techniques since 1935 have increased the rate of work from 1·2 to 3 acres/8-hr. day; costs per acre are roughly the same as in 1935. Conclusions drawn are: (1) South and west slopes in the Ozarks should where possible be converted to Pine. (2) Where undesirable trees cannot be sold they should be eliminated early, for the benefit of the understorey. (3) Cleaning in the understorey is useless unless combined with overhead release. (4) Vigorous coppicers like Chinquapin or Red Maple should be either poisoned to reduce sprouting or left uncut.

2996. HOLSOE, T. **Yellow-poplar: reaction to crown release and other factors affecting growth.** *Bull. W. Va. agric. Exp. Sta.* No. 344*T*, 1951. pp. 83. 27 refs.

A micro-dendrometer was used to measure weekly radial growth of 193 sample trees of *Liriodendron tulipifera* during the 1949 and 1950 growing seasons. During the dormant season, the crowns of 68 trees were released by amounts varying from 12·5% to more than 75%. A similar release was made for another 67 trees during the 1950 growing season when change in the cell structure of both light and shade leaves had ceased. The remaining trees were used as controls. It was found that trees reacted favourably to all degrees of release, whether made in the dormant or the growing season. The increase in basal-area growth corresponded to the amount of crown surface released. For the same degree of crown release, dominated trees showed a greater % increase in basal area than co-dominants, and co-dominants than dominants. Stem analysis of a tree released 9 years earlier showed that its form factor had improved, which indicates that the increased basal-area growth may also express an increase in volume. Using analyses of these results together with those from an earlier study [cf. *For. Abstr.* 12 (No. 1974)], recommendations are made for growing an individual tree in such way that it will maintain a compound-interest rate of 6% until it has reached a d.b.h. of 24 in.

2997. AREND, J. L., and STEPHENSON, J. R. **Some costs and effects of chemical release of Pine in northern Michigan.** *Tech. Note Lake St. For. Exp. Sta.* No. 367, 1952. pp. 1.

Tests were carried out in stands consisting of scrub Oaks, Aspen and Red Maple, underplanted with Red Pine. Figures showing time and amount of chemical needed per acre and per sq. ft. basal area for different treatments (axe felling or girdling, NH_4 sulphamate crystals applied in cuts or notches, and basal sprays using 2,4-D, or 2,4,5-T, or a combination of both) are tabulated. With the axe method, sprouts grew 1–3 ft. the first year after treatment. Nearly 100% top-kill was obtained with NH_4 sulphamate. Basal spray to a height of 4 ft. gave a 70–100% top-kill, but spraying to 2 ft. gave comparable results only with 2,4,5-T.

245. *Tending of Trees, Pruning etc.*

See Nos. 2986, 2988.

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS

2998. GRANICZNY, S. Zarys badań na temat dolesiania powierzchni pod drzewostanami lukowatymi i nadmiernie przerzedzonymi. [**Outline of investigations on the restocking of excessively thin stands.**] *Sylwan* 95 (1), 1951 (110–3). [Pol.pol.russ.]

As a result of sowings and plantings in younger Pine stands from 1947 to 1949, the suitability of tree species, both native and exotic, for beeting up and underplanting was determined, along with some assessments of the microclimatic factors, e.g. insolation, and soil and air temperatures, in gaps and poorly stocked forest. Specific recommendations for various sites are made.

2999. PIPAN, R. Povečanje prirastka v naših gozdovih. [**Increase of increment in our forests.**] *Nova Proizvodnja, Ljubljana* 2 (2/4), 1951 (206–15). [Sloven.e.]

The author describes how 40 years of enlightened management, essentially in the form of commonsense silvicultural measures, of a neglected estate at Lehno, Pohorje (S.W. of Maribor) have raised its productivity far above the national average. In 1906 it consisted of some 300 ha. of exploited and neglected peasant forest [species not specified]. Silvicultural measures were chiefly removal of mature and overmature trees, and thinnings. On a portion of the estate, in accordance with banking principles and anticipating Biolley, the owner early instituted a 'méthode du contrôle' [details not given] from which the following figures are derived. In 1909, the area carried only 47·50 cu.m./ha. of trees above 25 cm. d.b.h. and about 50 cu.m./ha. of smaller trees totalling 97·50 cu.m./ha. The figure for the larger trees rose in 1919 to 99·50, in 1928 to 125, in 1938 to 147, and in 1949 to 242 cu.m./ha., plus 55 cu.m./ha. of smaller trees, totalling 297 cu.m./ha. Utilization amounted to: 1·58 (cu.m./ha./year) for 1909–19, 5·38 for 1919–28, and 5·39 for 1928–38; owing to the war, fellings for 1939–49 averaged only 2·72 cu.m./ha./year. The volume increment in 1909 was calculated at 4 cu.m./ha., in 1919 it rose to 6·80, in 1928 to 8·11, in 1938 to 8·41, and in 1949 to 11·07 cu.m./ha./year. By contrast, the average-volume increment for all forests of Slovenia is estimated at 2·80 cu.m./ha./year.

26. FORESTRY IN AGRICULTURAL AND PASTORAL AREAS (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

3000. PAUL, W. R. C. **Notes on Legumes—I.** *Trop. Agriculturist, Ceylon* 107 (1), 1951 (15–20 + 7 plates). 11 refs. O.R.E.

Among legumes tried out at the Peradeniya Experiment Station were the following: (1) *Pueraria phaseoloides*, a vigorous ground cover and tropical counterpart of kudzu (*P. thunbergiana*). (2) *Sesbania cinerascens*, a useful shade tree. (3) *Indigofera teysmanii*, useful as a shade tree and for regeneration in land under shifting cultivation. (4) *Aeschynomene americana*, a good fodder species. Brief comments on habits, requirements, methods of propagation and uses are presented.

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

3001. ARNBORG, T. Från svedjebruk till hyggesbränning. [**From burning combined with temporary agriculture to burning over felling sites.**] *Norrlands SkogsvFörb. Tidskr.* 1949 (4), (399–432). 29 refs. [Sw.]

Outlines the history of '*svedjebruk*' [burning combined with temporary agriculture] in Sweden and its control. Discusses, from observation on old burnt-over land, once its use for arable and pasture has ceased, the natural regeneration, generally of mixed Birch, Pine and Spruce, often converted to pure Spruce by snow and wind damage. Discusses the use of controlled burning after clear felling to improve soil conditions and the selection and protection of seed trees to serve the burnt area.

263. *Irrigated Forests*

3002. [**Establishment of irrigated plantations.**] *Rep. For. Div. Sudan 1949*, 1950 (20).

An irrigated plantation was started on land in the Khor Abu Habl scheme; 90 feddans (ca. 94 acres) of clay land, deep-ridged by Kilifer ridger and tractor in May, were sown with *Acacia arabica* during July and August, and a further 10 feddans were sown on the flat. Small experimental plots of *Khaya senegalensis* and *Eucalyptus* spp. were planted on both ridged land and flat. Results on the flat were good and on the ridged land exceptionally good, in all cases. Mortality up to the end of the year was practically nil.

266. *Shelterbelts, Windbreaks*

See also Nos. 2814, 2828, 2965.

3003. LYSENKO, T. D. O častičnom izmenenii instrukcii po posevu polezaščitnyh lesnyh polos gnezdovym sposobom na 1950 god. [[**Modification of the instructions for sowing shelterbelts by the nest method in 1950.**] *Lesn. Hoz.* 3 (9), 1950 (27–8). [Russ.]

Cf. *For. Abstr.* 12 (No. 1989).

3004. POMARANOV, S. F. Les i sad. [**Forest and orchard.**] *Sad i Ogorod, Moskva* No. 12, 1950 (12–8). [Russ.russ.] E.M.B.

Presents observational data relating to the positive influence of forest shelterbelts (Birch and Spruce) on the microclimate of Apple orchards in Russia in Europe.

3005. SANNIKOV, V. S. Vlijanie sadozaščitnyh nasaždenij na rost i urožajnostj slivy. [**Effect of orchard-protecting plantations on the growth and yield of Plum.**] *Sad i Ogorod, Moskva* No. 12, 1950 (18–21). [Russ.] E.M.B.

Both the growth and fruit yield of various Plum varieties in the Southern Urals region are said to be more favourable near forest shelterbelts [Poplar, Maple, Caragana, and *Pyrus baccata*(?)].

3006. KONEV, G. I. Kedr sibirskiy v polezaščitnye polosy. [***Pinus sibirica* for shelter-belts.**] *Lesn. Hoz.* 3 (9), 1950 (83–4). [Russ.]

Urges that *P. sibirica* should be tried as a shelter-belt species in Siberia. In natural stands in W. Siberia much (10–20%) of the advance growth of this species occurs in natural 'nests' 0·1–0·2 sq. m. in area and usually carrying not more than 10 seedlings, which may be up to 3–4 m. tall. *P. sibirica* produces, besides its valuable timber, edible seeds containing 59·9% of fats, 16·6% of proteins and 12·4% of carbohydrates, by weight. Seeds from the Sayan and Partizan districts of Krasnoyarsk are exceptionally high in fats (68·2%). They have also a considerable vitamin-B content. Experiments at Tomsk show that the waste wood contains 0·4–0·66% (based on oven-dry weight) of essential oil suitable for soap making.

3007. FROST, F. Forsøk med sneskjermplantninger på Saltfjellet. [**Investigations on planting snowbreaks on Saltfjell.**] *Tidsskr. Skogbr.* 59 (6), 1951 (176–85). [Nor.]

Discusses the problems involved in planting snowbreaks along the railway running across Saltfjell, north of the Arctic circle, and reaching an altitude of 680 m. *Betula pubescens* (570 plants) has been planted on a trial plot above the local upper limit for Birch. Experiments were made in grafting local Pine from its upper limit on 14-year Pine in the nursery at Storforshei to serve as a small-scale seed orchard. Seed from *Abies* spp., *Picea* spp., *Chamaecyparis nootkatensis*, *Juniperus communis*, *Larix* spp., *Thuja* spp., *Tsuga* spp., and *Pinus* spp., has been obtained, generally either from northern latitudes or from high altitudes; it is being sown in nurseries in Helgeland and Rogaland.

3008. BATHEN, R.; FROST, F. Forsök med skjerm-planting i fjellet. [**Trials on shelter-planting in the mountains.**] *Tidsskr. Skogbr.* 59 (11/12), 1951 (390–4). [Nor.]

A further discussion on snowbreaks. Larch, Norway and Engelmann Spruce, and *Pinus cembra* have given good results in different districts.

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

See Nos. 2971, 3063, 3073 *et seq.*, 3264.

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

See also No. 2879.

3009. MORRISON, B. Y. **Concerning the U.S. National Arboretum.** *Gdn. J. N. Y. bot. Gdn.* 2 (1), 1952 (18–20).

Brief notes on past history and present work of the arboretum.

3010. DILLER, O. D., and CHADWICK, L. C. **The Secrest arboretum [,Wooster, Ohio].** *Spec. Circ. Ohio agric. Exp. Sta.* No. 82, 1950. pp. 23.

3011. DANFELJD, P. Smelee vnedrjatj kleny. [**Bolder introduction of Maples.**] *Lesn. Hoz.* 3 (9), 1950 (35–41). [Russ.]

Brief general notes on the characters of the chief *Acer* spp. of the U.S.S.R. with main reference to their use as decorative trees.

28. HUSBANDRY OF FOREST PRODUCTS OTHER THAN WOOD

See also section 89.

283. *Fruit and Seed Crops*

See also Nos. 2868, 2958, 3484, 3538.

3012. HARRISON, S. G. **Edible Pine kernels.** *Kew Bull.* 1951 (3), (371–5). 6 refs.

Notes on the uses, collecting and marketing of kernels of different Pine species throughout the world. [Cf. *For. Abstr.* 13 (No. 3006).]

284. *Crops Tapped for Exudations*

See also Nos. 3494–7.

3013. CLEMENTS, R. W., and SNOW, A. G., JR. **Virgin cupping with spiral gutters.** *Naval Stores Rev.* 61 (37), 1951 (12–3).

Describes the use of spiral gutters in first-year tapping; the bark is removed only where the cup is fixed. If double-headed nails are used, both gutters and nails can be used repeatedly. [Cf. *For. Abstr.* 11 (No. 3177).]

3014. SNOW, A. G., JR. **Clean-up streak for acid-treated faces.** *Naval Stores Rev.* 61 (42), 1952 (12–3).

An untreated freshening made in autumn removes acid-killed tissue above the resin face, and promotes early yields from the first treated freshening in the following spring. Heights of such freshenings average about 1 in. If the clean-up freshening is made in spring, about $\frac{1}{4}$–$\frac{1}{2}$ in. more bark than in autumn must be removed, but yields are greater.

3015. OUDIN, A. Activation de la production de gemme par vaporisation de solutions d'acide sulfurique. [**Stimulation of resin production by sulphuric-acid spraying.**] *Rev. for. franç.* 1952 (2), (77–86 + 4 photos). [F.]

The results of 4 years' experiments on *Pinus pinaster* in the Landes forests are presented, and the following provisional conclusions drawn. Chemical stimulation of large American faces (at bark-depth, 25 cm. wide and 30–35 cm. high at the end of the season), considerably increases and may even double production, but it rapidly exhausts the tree and can only be used for 'tapping to death'. Chemical stimulation of small American faces (at bark-depth, 9–10 cm. wide and 60 cm. high) gives a mean increase of 25–30% in production, and, when carefully done, impairs neither the vigour of the tree nor the quality of the resin. The optimum concentration of H_2SO_4 is 40% by weight.

3016. BOKOR, R. Gyantatermelésünk fokozása. [**The intensification of resin production in Hungary.**] *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (319–37 + 8 photos). [Hu.g.russ.]

Gives tabulated figures for *Pinus sylvestris* showing the increased production with 25% HCl spraying, over different lengths of time. Figures showing the average resin yield for trees grouped by diameter

classes show that with the old method, yield increases with d.b.h., reaching a maximum at ca. 35 cm. and then changing little, while with HCl the yield increases rapidly with d.b.h., reaching a maximum at 40–50 cm., then declining. Tree height bears no relation to resin yield. For both the old and new methods, yield increases with crown length for a constant d.b.h. *From author's summary.*

3017. Ostrowski, W., and Hyndle-Szmit, B. Analiza wyników żywicowania przeprowadzonego w latach 1948 i 1949 na terenie Lasów Doświadczalnych SGGW w Rogowie. [**Analysis of the results of resin tapping conducted in the Rogow experimental forests of the Central School of Agriculture in 1948–49.**] *Sylwan* 95 (2), 1951 (194–213). [Pol.russ.f.]

Account of an experimental tapping in uneven-aged Scots Pine forests near Rogow, situated at ca. 52° N. lat. and 20° E. long., at 170–255 m. alt., with an average annual temperature of 7·7° C. The tapping area was 99 ha. in 1948 and 177 ha. in 1949, with a final total of 50,656 faces, all herringbone type, ca. 37 cm. wide. Total yield for the two years was 119,176 kg. i.e. 2·36 kg. per face or 1·18 kg. per face p.a. The number of freshenings per face averaged 57, each tapper having 675 faces. Besides normal faces (height up to 180 cm.), 'high faces' (up to 370 cm.) were also tried. The average yield per freshening was: normal faces 40 g., high faces (180–270 cm.) 42 g., very high faces (270–370 cm.) 51 g. These results are not absolutely reliable because not all conditions were kept constant for all measurements, e.g. 61% of faces were 1st-year in 1948 and 36% in 1949. Monthly yields were: May—11·5, June—21·4, July—22·5, Aug.—21·3, Sept.—18·3, and Oct.—5% of the total yield; the yield of high faces was greater in May–June, and less in Aug.–Oct. than that of normal faces.

288. *Crops Grown for Animal Products*

3018. Ali, S. A. **Lac and its cultivation in Sind.** *Pakistan J. For.* 1 (4), 1951 (372–83).

289. *Miscellaneous (including Shade Trees for Crops)*

See also No. 3000.

3019. Simmonds, N. W. **Notes on field management at the Botany Department of the Imperial College of Tropical Agriculture, Trinidad.** *Trop. Agriculture, Trin.* 28 (1/6), 1951 (70–5 + 2 plates).

The work of the Department included experiments with *Gliricidia sepium* as a shade tree, and notes on its propagation and tending are presented. If the trees are pollarded early in the wet season (July), and again later in November and December the plants can largely be prevented from flowering and shedding their leaves during the dry season. A method is also described of making compost from sawdust, pen manure, fresh Elephant or Guatemala grass and NH_4 sulphamate.

3. HARVESTING OF WOOD, LOGGING AND TRANSPORT. RATIONALIZATION OF WORK; WORK STUDIES. FOREST ENGINEERING

31. LOGGING AND TRANSPORT: GENERAL

See also Nos. 2867, 3248, 3263.

3020. WINKOOP, W. VAN. **De organisatie van de bosexploitatie op Borneo.** [**The organization of forest exploitation in Borneo.**] *Tectona* 41 (1), 1951 (1–28). 15 refs. [Du.e.jav.]

Exploitation, until recently, was in private hands, on a small scale, and confined to river banks whence logs could be floated to the coast. Exploitation of stands at a distance from rivers necessitates heavy capital expenditure and will probably call for government enterprise.

32. FELLING AND RELATED OPERATIONS

See also No. 3248.

322. *Preparatory Measures*

3021. EWERS, J. **Some negative effects of chemical treatment of pulpwood trees.** *Pa. For. Wat.* 3 (6), 1951 (126–7).

Examination of some hundreds of trees (Red, Scarlet, Chestnut, Black, and White Oaks and Aspen) poison-girdled with Na_2HAsO_3 to facilitate barking, two months after treating, revealed little if any harmful translocation of the poison from treated to untreated stems, either by root graft or (in stem clumps) through a common root system [cf. *For. Abstr.* 13 (No. 1208)]. Examination in July 1951 of the stumps of 20 trees [species not stated] treated with Na_2HAsO_3 in July 1950 and subsequently felled, showed that the bark was alive on all trees below the treated line and that abundant sprouting had occurred on some of the smaller ones.

3022. CRAWFORD, F. S., and BIRD, J. H. **Treatment of timber.** *Information Circular, U.S. Bureau of Mines, Washington, D.C.* No. 7597, 1951. pp. 4 + 10 photos. D.S.I.R.

Describes several methods of impregnating green, standing trees, and advocates the use of chromated $ZnCl_2$, which has proved effective in the treatment of mine timbers. Much of the mine timber thus treated may be used without barking, as intact bark protects against excessive contact with the chemical. The method of treating timber in the forest is more economical as compared with operating separate timber-treating plants. The treated mine timbers can be stock-piled either in the forest or at the mine without fear of rapid deterioration. Chemicals other than chromated $ZnCl_2$ can also be used.

323. *Felling and Subsequent Primary Conversion*

See also Nos. 2719, 3026–31, 3261, 3350.

3023. **Timber—up the hill!** *Timberman* 53 (2), 1951 (74–80).

On tree farms of the Weyerhaeuser Timber Company in the Pacific Northwest, old-growth Douglas Fir on steep slopes is being felled uphill, by power saw, cable and winch, so reducing breakages. The ground is first cleared of larger windfalls likely to damage the trees as they are felled. A crew of 5 is used in the felling operation. A tractor with a double drum is driven on to an access road at the top of the hill, and stationed at least 200–500 ft. from the tree, with the double drum pointing towards it. A $\frac{5}{8}$-in. cable is run downhill to the tree, and fastened by the high climber 60–80 ft. above ground level. The fellers make the undercut, on the uphill side of the tree, then the back cut, and the cable is tightened until the tree falls in the right direction. The tractor can pull several trees from the same point, and pulling distances go up to 700–800 ft. from the tractor. The crew works progressively down-hill. Safety records so far have been good, although it is estimated that danger is increased by 40%. Increased cost is offset by the market value of the timber saved.

3024. LUNAM, E. A. **Mechanical slashing of pulpwood by Marathon.** *Pulp Paper Mag. Can.* 52 (13), 1951 (129–30). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1209 (*B*-7-c) Appendix D).

Describes the arrangement of the site, and methods of loading on to the [mobile] slasher. [Cf. *For. Abstr.* 13 (Nos. 3033–4).]

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE

See also No. 3048.

3025. PAULA, R. D. DE GARCIA. **A exploração racional do pinheiro do Paraná.** [**Rational exploitation of Paraná Pine.**] *Boletim do INT, Rio de Janeiro* 2 (2), 1951 (38–43). 5 refs. [Port.]

Under the present system of exploiting *Araucaria angustifolia* in Brazil, only 46% of the tree is utilized, usually as sawtimber. The author suggests that wood and knots at present wasted, could be used for pulping, plastic manufacture or dry distillation. Some information on the suitability of the wood for these purposes is presented. [Cf. *For. Abstr.* 11 (No. 2044).]

34. STORAGE IN THE FOREST AND AT LOG DUMPS

See Nos. 3427–9, 3437, 3441.

35. RATIONALIZATION OF WORK. WORK STUDIES

See also Nos. 3163, 3248, 3261, 3545.

3026. **Efficiency in logging operations.** *Technical Division Report, Office of Technical Services, U.S. Department of Commerce, Washington, D.C.* No. *IR*-6443 [*n.d.*]. pp. 4. 17 refs. P.R.

Answers to an inquiry, with a list of institutions engaged in time and motion studies relating to logging.

3027. KLEM, G. G. **Driftstekniske undersøkelser over hogst og hogstredskap.** [**Work studies on**

logging and logging tools.] *Medd. norske Skogsforsøksv.* 10 (2) (No. 36), 1949 (305–66). 8 refs. [Nor.nor.e.]

A study was made of the output of 16 experienced workers, using alternately their own tools and tools supplied by an equipment centre, between 25 Nov. 1946 and 2 Feb. 1947, in felling, cutting up and barking, timber in an even-aged Spruce stand. The most important points studied included: the rate of production by loggers using their own or supplied tools; the rate of production in cu.m. for different dimensions cut; the rate of production when cutting timber with unfrozen, semi-frozen ('tough') or frozen bark; production in relation to the present scale of payment; and absenteeism. Results included the following: (1) When workers had had a course of instruction in the maintenance of tools there was no difference in rate of production between men using their own or supplied tools. (2) The present system of payment by a basic rate plus a uniform rate per log, overpays on the higher and underpays on the lower dimensions, since the time per piece increases with decreasing size. (3) Rate of production was 25% lower for frozen and 17% lower for 'tough' than for unfrozen bark. Unfrozen bark was found at above – 2°, 'tough' bark between – 2° and – 5°, and frozen bark below – 5° C. (4) The total time spent by loggers on maintenance of their own tools was estimated at 3% of the total working time. (5) Absenteeism was estimated at 10·2% (5·3% for illness and 4·9% for other causes) of the total working time. (6) The average production per hour was 0·526 cu.m. with unfrozen, 0·436 cu.m. with 'tough' and 0·392 cu.m. with frozen bark. (7) The quantity cut per working day of 5·8 hr. was 3·05 cu.m. with unfrozen, 2·53 cu.m. with 'tough' and 2·27 cu.m. with frozen bark. (8) The net weight of the workers remained fairly constant throughout the period.

3028. GLÄSER, H. Zur Beurteilung von Waldarbeitersägen — zugleich Stellungnahme zu Fröhlich, 'Faustregel zur Beurteilung der Leistung von Waldsägen'. **[Assessing the performance of forest saws—with a critical note on Fröhlich's 'rule of thumb'.]** *Forst u. Holz* 6 (24), 1951 (359). 8 refs. [G.]

An answer to Fröhlich's article [cf. *For. Abstr.* 13 (No. 2198)], pointing out some of the variables affecting the performance of hand saws, particularly with regard to the pressure exerted.

3029. STENTZEL, E. E. Nochmals: Faustregel zur Beurteilung von Waldsägen. **[A further note on the 'rule of thumb for assessing the performance of forest saws'.]** *Forst u. Holz* 6 (24), 1951 (360–2). 16 refs. [G.]

Favourable comments on Fröhlich's method with suggested amendments of detail.

3030. DOUDA, V. Využití jednomužných řetězových pil při práci dřevorubecké. **[Use of one-man chain saws for tree felling.]** *Lesn. Práce* 29 (7/8), 1950 (290–318 + 2 tbls.). [Cz.cz.russ.e.]

Presents in the form of tables and graphs the results of comparative efficiency studies of felling and cross-cutting with a one-man 'Pioneer' (Industrial Engineering Ltd., Vancouver, B.C.) chain saw, and by hand saws. The studies were conducted in 1949 in a Czechoslovak state forest in Moravia, and results were almost wholly in favour of the chain saw.

3031. VEH, N. VON. Några ord om olycksfallsfrekvensen i skogs- och flottningsarbeten i Finland. **[A discussion on the frequency of accidents in forest and floating work in Finland.]** *Svenska SkogsvFören. Tidskr.* 49 (4), 1951 (357–64). [Sw.]

Tabulates figures to show the number of accidents, causing absence from work for different periods, permanent disablement, or death, among workers engaged in forest work or floating, and insured with the Försäkringsbolag Industri-Olycksfall (about 50% of the total numbers) over a period of 10 years. The total annual accident rate per 100 workers for different years in the period ranges from 7·86 to 16·87, the comparable range in Sweden being from 24·3 to 38·0. More than half the accidents cause absences from work of 1–4 weeks. As forest work is seasonal and it is difficult to assess the number employed in terms of a year's work (300 working days), figures showing the average daily wage of injured workers and of all insured workers for the metal and wood industries and for forest and floating work are compared. In the wood and metal industries, the average wage of injured workers is below the general average, as is to be expected since accidents are most frequent among unskilled workers. In forestry and floating, however, the average wage of injured workers is above the general average. This suggests some error in assessing the number of workers employed (calculated from the wages paid out), and that the accident rate is probably rather higher, but still below that for Sweden.

37. TRANSPORT

372/377. *Land Transport*

See also Nos. 2719, 2874, 2987, 3023, 3026, 3049.

3032. **Harvesting tropical hardwoods.** *Wood* 17 (1), 1952 (12–5).

Describes, with illustrations, the use of modern logging equipment in the French Cameroons.

3033. OLSON, E. O. **Latest mechanical developments on Marathon's operations.** *Pulp Paper Mag. Can.* 52 (13), 1951 (124, 126). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1208 (*B*–2) Appendix C.)

Describes new yarders and slashers. [Cf. *For. Abstr.* 13 (No. 3024).]

3034. HUSAK, N. **High lead yarding in bundles [at Marathon].** *Pulp Paper Mag. Can.* 52 (13), 1951 (132). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1212 (*B*–1) Appendix H.)

Two strips, 6–11 chains long and 1 chain wide, are felled across a block of timber at right angles to the main road. Wood is cut into 8-ft. lengths and piled 4 ft. high in piles not exceeding 1¼ cords, on skids set across the centre of the strip. The yarder is pulled in by tractor and set on the main road opposite a strip. A yarder crew consists of 7 men.

Bundle yarding at night, by specially mounted headlamps, has proved very successful.

3035. Watanabe, H., *et al.* **Studies on continuous cable-hauling of logs by sky line. 1. Experiments on the ground-hauling resistance of Sugi logs. 2. The light continuous yarder. 3. The first practical experiment in yarding.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (191–7). 2 refs. [Jap.e.]

Equipment (light petrol-engine yarder) and preliminary trials are described.

3036. **Extraction.** *Rep. For. Adm. Malaya 1950*, 1951 (5).

A demonstration of tractor logging carried out in Selangor proved conclusively that extraction costs could be greatly reduced, and did much to dispel fears that tractors might not be able to handle the timber. The experiment was carried out on the foothills of the main range among broken ridges and ravines, often very steep. The D-6 Caterpillar tractors equipped with dozers and rear winches had no difficulty in clearing every log. Costs in the experiment were probably higher than they would be in commercial practice, but even so were probably less than half that of hand logging.

3037. Oksa, E. Pyörätraktorien puutavarareet kehittyvät. **[On the development of timber sleds for wheel-tractors.]** *Metsät. Aikak.* 1951 (11), (299–300). [Fi.e.]

Describes a new sledge tested last winter for use behind a wheeled tractor; it is equally good for the transport of sawlogs and cordwood. The largest loads carried in the tests were 380 cu. ft. of logs or over 20 cu.m. of cordwood. *From author's summary.*

3038. Fujibayashi, M., Kato, S., Maruyama, M., and Kamiizaka, M. **The resistance of sledges used for tractor hauling.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (186–8). [Jap.e.]

The nature and amount of the resistance are investigated and discussed, with a graph and tables.

3039. Fujibayashi, M., Honda, M., and Yamawaki, S. **A sliding resistance test of a four-runner sled used with a tractor on snow.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (190–1). [Jap.e.]

The following results were obtained when sliding resistance of a 4-runner sledge, pulled by a 20-h.p. diesel-engine-powered winch, was measured with a drawbar dynamometer: (1) Although load ranges from 1985 to 5180 kg. were tested, with intensity of sliding pressure ranging from 0·60 to 1·56 kg./sq. cm., the coefficient of static and kinetic friction showed little obvious relation to load. (2) Resistance varied markedly with the length of standing time. The maximum coefficient of resistance was 1·0–1·2, after the sledge had stood overnight, 2·4–2·8 times as high as that after a stand of 10 min. *From authors' summary.*

3040. Eriksson, R. **Medens friktion mot snö och is. [The friction of a sledge runner on snow and ice.]** *Norrlands SkogsvFörb. Tidskr.* 1949 (1; 3), (125–46; 281–319). 11 refs. [Sw.sw.e.] (*Meddelanden från Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdeling* (*S.D.A.*) Nos. 34, 35.)

Most of the research was carried out in a refrigerating chamber with miniature sledges, but some tests were made in the open with normal logging sledges. Both starting and sliding friction were considered. The main factors examined were: temperature; the smoothness of the runner surface; the conductivity and rigidity of its material; the size of the runner; the particle size of the snow; and size of the load. Results are given in graphs with English legends. Recommendations for reducing friction in practice include: maintenance of the road surface, e.g. by icing the ruts; the use in cold weather of materials that are less good conductors of heat than steel; and a choice of load and runner size based on the knowledge that friction tends to decrease with increasing load and decreasing runner size. Further practical research is proposed.

3041. Czereyski, K. Próba ustalenia typu i stopnia przydatności dwukółki do zrywki drewna w terenach nizinnych. **[Trials for establishing the type and suitability of a sulky in lowland regions.]** *Sylwan* 95 (2), 1951 (238–54). 13 refs. [Pol.pol.]

Presents the results of dynamometer tests conducted with a two-wheel sulky designed by the Polish Forest Research Institute. It is shown, for a variety of surfaces, that skidding requires least tractive force if the load is suspended on the sulky at its centre of gravity.

3042. Simola, P. Pinotavaran teko palstatien varteen. **[Stacking cordwood along logging roads.]** *Metsät. Aikak.* 1950 (12), (387–90). [Fi.e.] (*Metsätehon Tiedoituksia* No. 51.)

A scheme is described for stacking cordwood along logging roads which are planned and cleared before snow falls, so that the suitability of the ground can be more easily assessed. Advantages claimed are (1) fewer horse accidents, (2) a system of roads built up for later use, and (3) trees left standing are saved from hauling damage. *From author's summary.*

3043. Kantola, M. Tukkien autoonkuormaus ja sen rationalisointi. **[Rationalization of log-loading on to lorries.]** *Metsät. Aikak.* 1950 (10), (323–8). [Fi.e.]

Discusses research by the Work Efficiency Association on the effect of loading by hand or using loading ramps, and considers the effect of the size of the logging area, the distance covered by lorry transport and the size and nature of depots, on the choice of loading appliances. Loading appliances most used in Finland are skids and boom loaders. *From author's summary.*

378. *Water Transport*

See also No. 3441.

3044. Gecow, R. Próba przydatności metody wiązania tratew przy pomocy łańcuchów. **[Suitability of chains for binding rafts.]** *Sylwan* 95 (3/4), 1951 (399–412). 6 refs. [Pol.]

Presents the results of an investigation on the advisability of binding log rafts (having logs up to 23 m. long) with chains instead of the usual method of using cross-poles, nails and wire. It has been found that chains are more economical because: (1) logs are not damaged, (2) saws are not damaged

by nails left in the wood, and (3) the chains can be used repeatedly, whereas nails and wire cannot. Moreover, chain-bound rafts afford a smoother passage through narrow sluices, since it is much easier to detach part of a chain-bound raft than to hack off part of a nailed one. The tests have so far been conducted on lakes and canals.

3045. EKLUND, R. Hinaajan taloudellinen koko sisävesilauttauksessa. **[The economical use of tugs on inland waterways.]** *Metsät. Aikak.* 1950 (10), (330–2). [Fi.e.] (*Metsätehon Tiedoituksia* No. 46.)

Large rafts give the best results both in the towing power needed per unit of rafted material and in the saving of travelling time when unloaded; maximum size for rafts is determined by the channels and the weather. Experience indicates that optimum towing speed is about 1·5 km./hr. From graphs based on measurements, the optimum towing power for a raft of a given size towed at a given speed can be determined, and from this the tug's engine capacity can also be determined. *From author's summary.*

38. FOREST ENGINEERING

See also Nos. 2719, 3064.

3046. [MOLESWORTH, F. C.] **Notes on forest engineering.** Dept. of Forestry, University College of N. Wales, Bangor. 1951. pp. 80. 16 refs. Price 4*s.* 6*d.*

This book has developed out of the author's notes for the use of his students, but is intended also as a *vade mecum* for forest officers. It has the following sections: definitions; labour; materials; transport; roads; bridges; building construction; tables and formulae.

382. *Buildings*

See No. 3548.

383. *Roads and Bridges*

See also No. 3042.

3047. BERGER, J. Waldstrassenbau mit Motorgrader. **[Construction of forest roads with a motor grader.]** *Mitt. öst. Ges. Holzforsch.* 3 (5), 1951 (12–5). [G.] P.R.

General description of motor graders and experimental work done with U.S. graders in Austria.

3048. VOEVODA, D. K. Tjaželyĭ pricepnoĭ ryhlitelj. **[A heavy trailer-type soil loosener.]** *Lesn. Hoz.* 3 (8), 1950 (63–4). [Russ.]

The D-162 was originally designed for clearing shrubs, roots and stones and for soil loosening in road building and maintenance operations, but can also be used in forestry for various similar purposes, including the removal of soft hardwood stumps, 8 years or more after felling, up to 26 cm. in diam. It is intended to be drawn by the S-80 tractor, weighs 4,200 kg. and will work a strip 2·4 m. wide, to a depth of 55 cm., having 5 heavy steel claws that can be raised and lowered by a winch fitted to the tractor. A photograph, sectional diagrams, and a partial specification of the implement are included.

3049. PYLVÄNEN, P. Lumiauran työntölaite, malli Immonen/50. **[Snow-plough push device, Model Immonen/50, aids snow ploughing by horses.]** *Metsät. Aikak* 1950 (10), (329–30). [Fi.e.] (*Metsätehon Tiedoituksia* No. 45.)

The plough and two sledges are combined into one unit by cross-bars and push-thills. The leading horse pulls and guides the plough, while the other two both pull the sledges and push the plough. The strain is fairly evenly distributed among the three horses. The construction is illustrated in photographs and a diagram. *From author's summary.*

384. *Protective Works*

See Nos. 2971–2.

385. *Drainage, Irrigation, Sedimentation. Water Supply*

See also Nos. 2719, 2980.

3050. LINDBERG, K. Rationaliseringsfrågor på dikningsfronten. **[Problems of rationalization in drainage work.]** *Norrlands SkogsvFörb. Tidskr.* 1949 (4), (370–96). [Sw.]

An account of an excursion in Norway, with discussion on Norwegian experience of constructing drainage systems with explosives, and the cost, advantages and disadvantages of the method. [Cf. *For. Abstr.* 13 (No. 1279).]

386. *Waterways. Stream Training*

See No. 2972.

3051. CLARK, S. F., and HEBB, E. A. **Mortality in Pine stands during first year after logging.** *Sth. Lumberm.* 183 (2297), 1951 (256, 258).

First-year results of a study carried out by the Southern Forest Experiment Station in Texas on an area well stocked with 35-year Loblolly and Shortleaf Pine show that the main causes of mortality in the first year after felling were insects (*Ips* spp. and *Dendroctonus terebrans*), wind, logging damage and lightning, in that order.

3052. Plagas y enfermedades del bosque de Chapultepec. [**Diseases and pests of the Chapultepec forest.**] Secretaría de Agricultura y Ganadería, Dirección General Forestal y de Caza, México. 1951. pp. 64 + 1 map + 15 plates. [Span.]

An inventory was made of attacked trees of the more important species, viz. *Cupressus* sp., *Pinus* sp., *Platanus* sp., and some others, and the type of attack, character of the insect or fungus, and control methods are described.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 3132, 3136–43, 3152–4, 3159, 3166–7, 3171, 3173–4, 3176, 3185.

414. *Chemical Control*

3053. **Special plane applies pesticides and fertilizer.** *Agricultural Chemicals, Baltimore* 6 (4), 1951 (41, 117–8). E.M.B.

Describes a new type of aircraft specially designed at the Texas Agricultural and Mechanical College for dusting and spraying. The plane is easy to manoeuvre, and is so constructed that the pilot can see the ground immediately ahead of and below him. It can carry a load of 800 lb. with ease, and can take up to 1,200 lb. under favourable conditions. There are separate dust hoppers and spray tanks so that it is possible to switch over from dusting to spraying at a moment's notice. A 27-cu.-ft. hopper is contained in the fuselage, and there is also space in the outer wing panels for the same total hopper capacity, in case a more uniform or wider dispersal of materials is required. There are 2 spray tanks in the centre section of each wing, and spray booms are situated in the space between the wing proper and the flaps. A mechanical drive from the engine will operate either the spray pump or an agitator for the dust hopper. The plane can take off from small turf strips and can climb 50 ft. in ¼ mile. It is still in the experimental stage, however, and subject to alteration.

416. *Types of Injury*

See Nos. 2752, 2788–9.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

See Nos. 2991, 3051, 3059.

422. *Temperature Influences. Frost. Heat. Drought*

See also Nos. 2838, 2850, 2900–1.

3054. TRUE, R. P., and TRYON, E. H. **Blister-shake, a weather-induced defect in Yellow Poplar.** *Bull. W. Va. agric. Exp. Sta.* No. 350T, 1952. pp. 15. 12 refs.

Narrow tangential cavities between growth rings of *Liriodendron tulipifera* ranging from ¼ to all the way round the bole and extending from ground level to a height of 5–11 ft. are described, and are attributed to the effects of a late frost, with alternate freezing and thawing, following the severe winter of 1935–6.

3055. PATTON, R. F. **Needle droop of Red Pine.** *Abstr.* in *Phytopathology* 42 (1), 1952 (16).

Abnormal drooping and dying of current season's needles in *Pinus resinosa* in Wisconsin were investigated. Inoculations with *Pullularia* sp. produced no droop symptoms, but typical symptoms appeared when needles and stems were dried through rapid transpiration accompanying a limited moisture supply. *Pullularia* sp. appeared as a secondary invader of dead tissue. [Cf. *For. Abstr.* 1 (240); 4 (59).]

3056. DANILOV, M. D. Usyhanie klena ostrolistnogo v kuljturah duba. [**Dieback of *Acer platanoides* in Oak plantations.**] *Lesn. Hoz.* 3 (8), 1950 (79–81). [Russ.]

In the early 1930s the abundant but suppressed advance growth of *A. platanoides* in pure 30- to 40-year-old Oak plantations in the Chuvash A.S.S.R., was thinned out to encourage its development as a second storey. This measure, and the self-thinning of the Oak overwood, had produced a fairly good second storey on many areas by 1948. In that summer, however, mass dieback of the Maple was observed, the trouble having apparently begun in 1947. Dieback showed no correlation with age or size of the Maples; even small suppressed trees 3–4 m. high were affected. Trees affected the previous year were bare at the top, and the leaves on the lower part of the crown dried up. Other trees had developed their complete foliage in spring, but this had later withered in whole or part. In trees with completely dry crowns, the top of the stem had also died back.

Where the Oak had any considerable admixture of Lime, there was less dieback; and on felling sites with no Oak, or only young (10- to 15-year-old) Oak, the dense growth of Maple showed no dieback, nor was it observed in 80- to 120-year-old Oak stands with Lime and Maple as a second storey. The Oak itself did not die back, and it is considered that the trouble was due to root competition in the

prevailing droughts of the years concerned. Once Oak has closed canopy, its root system shows vigorous lateral extension and there is a strong tendency to suppression of associated species, hence the advantage of Lysenko's method of forming mixtures by pure groups.

The moisture content of the affected Maples was determined at different heights up the stems. It was concluded that many trees were capable of recovery if water supplies returned to normal. Others, in which dieback had affected the stem as well as the crown, might be saved by coppicing.

423. *Precipitations*

See also No. 2991.

3057. HIRATA, T., and HOTTA, Y. **On the snow-storm damage (14–15 Feb. 1951) in the University Forest, Chiba Prefecture.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (45–55 + 6 photos). [Jap.jap.e.]

The following conclusions were drawn from observations of the damage: (1) Stands on steep leeward slopes are most and those on ridges least exposed to damage. (2) Stands on concave slopes between ridges, except those on the windward side, are also liable to damage. (3) *Cryptomeria japonica* is less firm than *Chamaecyparis obtusa*, in snow storms as in ordinary storms. *From authors' summary.*

424. *Soil Conditions. Erosion Effects*

See also Nos. 2843, 2895, 3084.

3058. GESSEL, S. P., WALKER, R. B., and HADDOCK, P. G. **Preliminary report on mineral deficiencies in Douglas Fir and Western Red Cedar.** *Proc. Soil Sci. Soc. Amer. 1950*, 15, 1951 (364–9). 11 refs. L.S.

The mineral nutrition of *Pseudotsuga taxifolia* and *Thuja plicata* was studied by the following means: (1) foliage analyses of trees from different sites and of various degrees of vigour, (2) growth of seedlings in sand cultures and nutrient solutions, (3) pot-culture tests with romaine lettuce, (4) field fertilization of established stands. Some preliminary data are presented. *P. taxifolia:* N content of leaves was increased by applications of N fertilizer. Soil N content seems important and N content of leaf tissue is probably a good index of growing conditions for this species. It showed no definite response to P additions during 1 growing season. *Thuja plicata:* Ca content of the foliage is higher than in *P. taxifolia*, and older needles have a higher Ca content than current growth.

425. *Chemical Influences (Atmospheric)*

See also No. 3084.

3059. **Effects of the 1948 hurricanes. 1. Effects of the hurricanes on Cedar trees. 2. Effects of the hurricanes on Cedar insects.** *Rep. Dep. Agric. Bermuda 1948*, 1949 (17–9).

Two severe hurricanes in Sept. and Oct. 1948 caused unusually extensive damage to the foliage of *Juniperus bermudiana*, thousands of trees being largely defoliated as a result of a heavy drenching with undiluted salt spray, though this species is usually comparatively unaffected by salt spray. The effect of the hurricanes on the Juniper scale (*Diaspis visci*) and its principal predator (*Lindorus lophanthae*) was investigated. The former appeared to have suffered little, except where the host trees had been defoliated by spray. Although many adults of *Lindorus* were probably destroyed by the hurricanes, it is still abundant and actively breeding. [Cf. *For. Abstr.* 13 (Nos. 3152–3).]

43. FOREST FIRES

431. *Predisposing Factors and Causes. Fire Danger. Fire Behaviour*

3060. FOLEY, J. C. **A study of meteorological conditions associated with bush and grass fires and fire protection strategy in Australia.** *Bulletin of the Commonwealth of Australia Bureau of Meteorology* No. 38, 1947. pp. 234. 103 refs.

3061. **Fire-grading of forests.** *Rep. Fire Res. Bd., Lond. 1950*, 1951 (31).

Experiments with foliage of Norway Spruce, Japanese Larch, Silver Birch, and three species of Poplar, showed that the minimum intensity of radiation required to maintain the flame was considerably greater for the deciduous trees than for Spruce. One of the Poplars (*P. petrowskyana*) did not flame at all, but charred progressively.

3062. DOYLE, J. A. **A survey of forest fire causes [in Canada] and suggested corrective measures.** *For. Chron.* 27 (4), 1951 (335–48).

Deals with human agencies and possible educational and propaganda measures.

432. *Prevention and Control*

3063. HUGHES, R. H., and REA, J. L., JR. **Forage for fire protection: grazed firebreaks in the North Carolina coastal plain.** *Sth. Lumberm.* 183 (2297), 1951 (157–60).

An account of methods of preparing the ground for sowing with forage crops, and of the comparative protection afforded by different fodder species. [Cf. *For. Abstr.* 13 (Nos. 2238–9).]

3064. STEWART, G. I. **Engineering in forest protection.** *Mechanical Engineering, Easton, Pa.* 73 (6), 1951 (477–80, 495). D.S.I.R.

The change from manual to machine equipment in forest fire control has shifted emphasis from problems of organizing manpower to those of a complex field of engineering. Engineering procedures are necessary in developing and manufacturing all classes of machine units required to suppress forest fires. The gradual development of models of ploughing machinery, and the subsequent manufacture of successful models are described as an example.

3065. **The use of foam in forest fires.** *Rep. Fire Res. Bd., Lond. 1950*, 1951 (31).

Comparison was made of the effectiveness of water and mechanically produced foam for combating the spread of fire in two sample plots of Scots Pine of an age that represents a high fire hazard. The rate of spread of fire diminished much more

rapidly in the plot treated with foam, and foam treatment also prevented the fire from spreading more than half-way through the treated area, whereas the water-treated plot burnt right through.

433. *Salvage and Disposal of Fire-damaged Timber*

3066. McConkey, T. W., and Gedney, D. R. **A guide for salvaging White Pine injured by forest fires.** *Ntheast. Res. Note Ntheast. For. Exp. Sta.* No. 11, 1951 (1–4).

In a study of trees damaged by fire in 1947, 122 sample trees were selected and examined to find relationships between degree of root and crown injury, size of tree and survival. Figures showing survival for the different categories for 1947 to 1950 are tabulated. Smaller trees, of d.b.h. 6 in. or less, readily succumb to heavy root or crown injury. In trees of all sizes root injury appears to be more serious than crown injury. In salvage operations completely-killed stands should be felled first, followed by those, especially if the trees are small, where the root systems of most or all trees have been severely damaged. In stands where root injury is less serious, especially when crown injury is light, salvage felling can be delayed for a year. Where possible at least 25 seed trees should be left per acre. The best to leave are those above 12 in. d.b.h. with only slight root injury. Medium and small trees can be left if root and crown injury is slight.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

See also Nos. 2831, 3061.

3067. Richardson, S. D. **Forest fire insurance. Part 2. Forest fire insurance in Great Britain.** *Quart. J. For.* 46 (1), 1952 (28–37). 7 refs.

Cf. *For. Abstr.* 13 (No. 2245).

3068. Walters, W. **Forest fire insurance in North America with special reference to B.C.** *B.C. Lumberm.* 35 (12), 1951 (47–8, 108–118). 10 refs.

Discusses the demand and need for fire insurance, insurance rates, and methods of organization.

3069. **Effect of fire on Teak.** *Rep. For. Div. Sudan 1949*, 1950 (29).

Four 1-feddan (= 1·038 acre) plots in Teak plantations 3, 4, 5, and 6 years old respectively, were early-burned to determine the effect of fire on Teak of these ages. Although none was killed, the leading shoots of the younger trees were killed back 1–2 ft., and irregularity in flushing was noted in all cases.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See also Nos. 2838, 3001.

3070. Grischow, G. F. **Effect of winter burning on Slash Pine growth.** *Sth. Lumberm.* 183 (2297), 1951 (260–264). 7 refs. [Southeastern Forest Experiment Station.]

After 5 years, regression analyses showed that a winter headfire caused marked reduction in height and diameter growth; controlled burning by backfires had little or no effect when trees were more than about 12 ft. high. [Cf. *For. Abstr.* 12 (No. 2519).]

3071. Burchard. Kjemikalier som hjelpemiddel ved lyngsvidning. [**The use of chemicals in heather-burning.**] *Tidsskr. Skogbr.* 59 (7/8), 1951 (278–80). [Nor.]

During a course on heather-burning, mono-ammonium phosphate ($NH_4H_2PO_4$) sprayed experimentally on strips and plots effectively stopped the fire on the areas sprayed.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 2997, 3539.

3072. Wijk, C. L. van. **Problems in mechanical tillage of *lalang* [*Imperata*] plains.** *Tectona* 41 (1), 1951 (29–35). 6 refs. [E.e.jav.]

Under favourable conditions, ca. 7·5 acres can be ploughed in an 8-hr. day, using a 57-h.p. 'International' diesel tractor TD14 and a 4-disk plough. Fast growing legumes should be sown after tillage.

3073. Egler, F. E. **Report on the WHDH brush elimination project of the Boston Herald Traveler Corporation.** *Proc. 5th Ntheast. Weed Control Conf.* 1951 (247–9). O.R.E.

The project, begun in 1949, is designed to convert brush to various kinds of grassland and shrubland, by means of dormant basal sprays. Some data and results to date are presented.

3074. Suggitt, J. W. **Chemical control of dormant brush.** *Proc. 4th Mtg. east. Sect. nat. Weed Comm. Can.* 1951 (53–4). [Hydro Electric Power Commission of Ontario.] O.R.E.

Report on a brush-control programme, using 2,4,5-T at 8,000 p.p.m. during the dormant season at a rate of 70–90 gal./acre. Good results were obtained from spraying stems and lower branches. Mature standing trees were killed by cutting the lower bark and treating the cut with a full-strength mixture of equal parts of 2,4-D and 2,4,5-T.

3075. Mullison, W. R., Coulter, L. L., and Barrons, K. C. **Comparative herbicidal effectiveness of certain alkyl and glycol esters of 2,4-D and 2,4,5-T.** *Proc. 5th Ntheast. Weed Control Conf.* 1951 (87–94). 3 refs. [Dow Chemical Co.] O.R.E.

Field experiments included tests on: (1) *Fraxinus americana:* Sprays of 2½ lb. acid equivalent in 100 gal. water of the polypropylene glycol butyl ether esters of both substances gave results markedly superior to those of the isopropyl esters, i.e. approaching a 90% kill. (2) *Acer saccharinum:* Complete control of coppicing stumps was obtained by spraying with 2½ lb. acid equivalent of the polypropylene glycol butyl ether ester of 2,4,5-T. Esters of 2,4,5-T were distinctly superior to those of 2,4-D. (3) *Symphoricarpos occidentalis:* Good control was obtained with sprays of the polypropylene glycol butyl ether ester of 2,4-D at the rate of 1 lb. acid equivalent/acre. (4) *Quercus* spp.: Various concentrations of the polypropylene glycol butyl ether ester of 2,4,5-T were tested and proved more

effective than the isopropyl ester. [Cf. *For. Abstr.* 13 (No. 1307).]

3076. PRIDHAM, A. M. S. **Progress report on control of woody weeds in winter.** *Proc. 5th Ntheast. Weed Control Conf.* 1951 (243–6). O.R.E.

Seedling *Fraxinus americana* up to 1 in. in diam. were killed by basal spraying during January–March with mixtures of the methyl and isopropyl esters of 2,4,5-T mixed with oil in a ratio of 1 vol. 2,4,5-T to 3 vol. or less of fuel oil at a rate of 60 gal./acre. Cutting small brush did not make it more susceptible to the herbicide, though cutting of plants of 4 in. d.b.h. and up did seem to increase the effect. *From author's summary.*

3077. HALLS, L. K., and BURTON, G. W. **Effect of 2,4-D, 2,4,5-T and sodium trichloroacetate on Gallberry [*Ilex glabra*].** *J. For.* 49 (12), 1951 (895–7).

Best results were obtained with 2,4,5-T at a concentration of 1 gal./100 gal. water or a combination of ¾ gal. each of 2,4-D and 2,4,5-T/100 gal. water at a rate of 175 gal./acre.

3078. FISHER, C. E. **Control of Mesquite with growth regulator chemicals.** *Proc. 4th ann. Sth. Weed Conf.* 1951 (102–5). O.R.E.

[Cf. *For. Abstr.* 13 (No. 1307)]. Tests on *Prosopis juliflora* in 1950 showed that control is dependent upon factors influencing translocation and is most effective when there is an abundance of soil moisture 60 days before spraying. A 25% diesel-oil/water emulsion at 4 gal./acre proved the most effective and economical carrier. Coppice growth and small trees 3–5 ft. high are more controllable by aircraft sprays than large trees.

3079. GELUWE, J. VAN, FLAGG, C. V., BEATTY, R. H., and LACKO, E. **Progress report on the use of 2,4-D and 2,4,5-T for Thorn Apple control in pastures.** *Proc. 5th Ntheast. Weed Control Conf.* 1951 (235–42). O.R.E.

Trials of the effects of 2,4,5-T and combinations of 2,4-D and 2,4,5-T on *Crataegus* sp. were begun in August 1949. An account of the experiments and year-by-year observations are presented, with some preliminary conclusions. [Cf. *For. Abstr.* 13 (No. 1307).]

3080. NATION, H. A. **Palmetto can be controlled with chemicals.** *Proc. 4th ann. Sth. Weed Conf.* 1951 (94–6). 1 ref. O.R.E.

Various experiments and commercial work have shown that oil increases the effectiveness of 2,4,5-T on *Serenoa repens*, and that the season of application is important. Spraying in October–December of 3 lb. acid equivalent of the propylene glycol butyl ether ester of 2,4,5-T with 10 gal. oil in 90 gal. water gives satisfactory control, provided that the plants are thoroughly wetted with the spray. [Cf. *For. Abstr.* 13 (No. 402).]

3081. SRIVASTAVA, T. N. **The application of selective herbicides to forestry practice.** *Indian For.* 78 (1), 1952 (11–25). 86 refs.

[Cf. *For. Abstr.* 13 (No. 1145).] Investigations into the herbicidal effects of three phenoxyacetic compounds (NaMCPA, NaDCPA, TCPA) and IPC (isopropyl-N-phenylcarbamate) on the pre-emergent stages of 11 tree species, both coniferous and broadleaved, have revealed varying degrees of toxicity. IPC in general proved to be less toxic than the phenoxyacetic compounds, and the latter were more toxic to broadleaved than to coniferous species. From investigations into the effects of a number of herbicides on the post-emergent stages of Scots Pine, Sitka Spruce and Japanese Larch grown in pots and nursery beds, it appears that the lighter oil fractions show the greatest promise for weed control in forest nurseries. Further trials should be made of the use of $KOC_2H_5CS_2$ with Sitka Spruce and Scots Pine and of Amm. DNBP (NH_4 dinitro-secondary-butyl-phenol) with Scots Pine. Other substances tested ($NH_4SO_3NH_2$, NaCNS, Na pentachlorophenate, diesel oil and lubricating oil extract) proved too toxic. *From author's summary.*

3082. PALFREY, G. D., and ROLAND, A. E. **Chemical weed control experiments in Nova Scotia, 1950.** *Proc. 4th Mtg. east. Sect. nat. Weed Comm. Can.* 1951 (35–9). O.R.E.

The experiments included: (1) Spraying conifer seedlings in July with light oil—*Pinus sylvestris* and *P. banksiana* (1- and 2-year beds) suffered considerable injury; *Picea abies* (1st-year bed) suffered less and would probably withstand light applications. (2) Control of *Acer rubrum*—highest foliage kill was obtained with the propylene glycol butyl ether ester of 2,4,5-T.

3083. HARTIGAN, D., and TRUMAN, R. **Use of weedicides in forestry.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 5 (2), 1951 (3–4).

In tests carried out in Australia a combination of 2,4-D and 2,4,5-T ester, sprayed from apparatus used for fighting bush fires, successfully killed Lantana and blackberry. Preliminary results indicate that neither the conifers (*Araucaria bidwilli*, *Pinus taeda* and *P. caribaea*) nor *Eucalyptus* spp. in the sprayed plantations have been damaged.

3084. **2,4-D tree injury.** *Agricultural Chemicals, Baltimore* 6 (3), 1951 (42–3, 122–3, 125). E.M.B.

May be caused by careless application, vapour drift or absorption through the soil. Ways of diagnosing such injury are discussed.

3085. POUND, C. E. **Physiological effects of certain weedicides on *Rhus toxicodendron* L.** *Proc. 5th Ntheast. Weed Control Conf.* 1951 (319–20). O.R.E.

443. *Fungi and Bacteria*

See also Nos. 2790–1, 2881, 2901, 3051–2, 3190–1.

3086. HUBERT, F. P. **Common names of diseases of woody plants.** *Suppl. Plant Dis. Reptr.* No. 207. 1951. pp. 234. A.P.B.

In two parts: (1) an alphabetical list of common names of diseases, with the corresponding scientific names of the causes; and (2) an alphabetical list of scientific names, with the common names of the diseases. The area covered is confined to the U.S.A., Alaska, Hawaii, the Panama Canal Zone and Puerto Rico.

3087. BAXTER, D. V. **Pathology in the future forest practice in Alaska.** *Bulletin of the National Research Council, Washington* No. 122, 1951 (119). O.R.S.

An abstract of a paper on forest fungi (mostly circumpolar in distribution) and wood-destroying and -staining fungi. *Pucciniastrum alaskanum* is mentioned as likely to cause damage to trees when the virgin timberlands are disturbed.

3088. RICH, S. **Using half-tree plots for increasing efficiency of fungicidal tests.** *Abstr.* in *Phytopathology* 42 (2), 1952 (114).

Describes tests to find the comparative effects of fungicides by trying them out on the opposite halves of the same tree. It is thought that the technique could possibly be used to detect systemic effects.

3089. GÖRNITZ, K., and HARNACK, W. Zur Frage der fungiziden Wirkung von Benetzungsmitteln. [**The fungicidal effects of wetting agents.**] *NachrBl. dtsch. PflSchDienst.* 5 (11), 1951 (206–8). 8 refs. [G.]

The physical effects of wetting agents on fungi are described. Although hindering growth and destroying zoospores and mycelia, these agents cannot properly be called fungicides since they do not act directly on the fungus by virtue of their chemical composition, but indirectly through a physical effect on the substratum.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also Nos. 2940–1, 2957.

3090. ITO, K., and HOSAKA, Y. **Gray mould and sclerotial disease of Sugi (*Cryptomeria japonica* D. Don.) seedlings, the causes of the so-called 'snow mould'.** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 51, 1951 (1–32). Many refs. [Jap.jap.e.]

The causal fungi of damage to Sugi seedlings under snow were found to be *Botrytis cinerea* and, less pathogenic, *Sclerotinia kitajimana* sp. nov. Laboratory cultures of the fungi are discussed and illustrated. Inoculation experiments showed that *Larix leptolepis*, *Pinus densiflora* and *Cryptomeria japonica* are very susceptible, and *Chamaecyparis obtusa* very resistant, to both fungi.

3091. CARRANZA, J. M. Una *Alternaria* parásita de las coníferas en la Argentina. [**An *Alternaria* parasitic on conifers in Argentina.**] *Lilloa* 21, 1949 (279–89 + 4 plates). 12 refs. [Span.e.]

A fungus attacking 1-year-old Pine seedlings proved to be of the *Alternaria tenuis* group. Inoculation gave positive results with *Pinus pinea* and *Cupressus torulosa* 4 months old and upwards, but attempts to produce damping-off in seedlings 2–3 weeks old had little result. Symptoms of attack are wilting, chlorosis, and death of branches, twigs and leaves. A description of the fungus in culture is presented.

3092. MORIONDO, F. La ruggine curvatrice dei germogli sul pino domestico. [***Melampsora pinitorqua* rust of seedlings of *Pinus pinea*.**] *Ital. for. mont.* 6 (6), 1951 (314–7). 7 refs. [It.it.f.e.]

Account of an epidemic near Orbetello, Tuscany.

443.3. Diseases of Older Stages

3093. PŘÍHODA, A. Účast hub na odumírání a hnilobě smrků v horských lesích. [**Part played by fungi in the death and decay of Spruce in mountain forests.**] *Lesn. Práce* 29 (5/6), 1950 (165–82 + 4 photos). 26 refs. [Cz.cz.russ.f.]

Lists, with notes on occurrence, 21 parasitic and saprophytic fungi found on trees in the mountains of Czechoslovakia.

3094. PATEL, M. K., BHATT, V. V., and KULKARNI, Y. S. **Three new bacterial diseases of plants from Bombay.** *Curr. Sci.* 20 (12), 1951 (326–7). A.P.B.

Describes three new species of bacteria and the symptoms they cause, viz. *Xanthomonas lawsoniae* on *Lawsonia alba*, *X. tamarindi* on *Tamarindus indica* and *X. poinsetticola* on *Euphorbia pulcherrima*.

Stem, Butt and Root Rots; Root Diseases

3095. RISHBETH, J. **Control of *Fomes annosus* Fr.** *Forestry* 25 (1), 1952 (41–50). 18 refs.

The life history is outlined and some existing control methods reviewed. New methods are suggested and the experiments which tested some of them are described. Evidence is given that infection can be greatly reduced by covering conifer stumps, immediately after felling the trees, with a mixture of tar and creosote or with a suitable paint. Some biological control of stump infection is exercised by the purely saprophytic fungus *Peniophora gigantea*, but it is not possible at present to suggest a cheap, practical method for facilitating this control. The practical value of the various methods is discussed and the importance of instituting some form of control is emphasized. [Cf. *For. Abstr.* 13 (No. 2256).] *Author's summary.*

3096. ANKUDINOV, A. M. Usyhanie sosnovyh kuljtur na staryh pašnjah. [**Death of Pine plantations on former arable land.**] *Lesn. Hoz.* 3 (9), 1950 (46–49). [Russ.]

Pine plantations on old arable land in the forest-steppe zone of the U.S.S.R. often begin to die back and thin out at 20–30 years of age, attack by *Fomes annosus* being largely concerned in this process. It is only in recent years that mass attack by this fungus has been observed in the U.S.S.R., chiefly on old arable land in plantations aged 25 to 40 years. Pogrebnjak attributes the trouble on such land, and on land in general that has long been cleared of forest, to restriction of the rhizosphere by soil compaction and the blocking up of the soil spaces resulting from root decay and the activities of the soil fauna etc., not only in heavy but also in sandy soils. An extensive study of infected stands in 1944–6 showed that on such soils almost all the trees, whether healthy or diseased, had a dead or dying tap root by 30–40 years of age. Healthy trees had well developed horizontal root systems, while on diseased trees only about 20% of the roots were alive. The trouble was worst in trees with retarded growth, and those growing on low-lying sites. Death of roots also occurred in the absence of fungus attack, apparently as a result of unfavourable physical soil properties and/or a shallow rooting zone.

A layer of compacted soil was always present at some depth, and the live roots were as a rule found only above this layer, which was more pronounced and closer to the surface in low-lying places. Where fungus attack was absent, the superficial root systems were sufficient to maintain healthy growth in spite of the death of tap roots and a proportion of the laterals. Often such stands were of the first quality class. Where *Fomes* is present, however, infection is facilitated. For plantations on this type of land, hardwoods such as Birch, Alder, Aspen, Poplar etc., have the double advantage of limiting the spread of the fungus and improving the soil. No pure Pine plantations should be made on these sites: if some Pine is desired, it should be planted in a chequerboard or 'nest' type of mixture containing at least 50% of hardwoods and shrubs. Plantings of pure Pine should be confined to felling sites with a fresh soil and to drier Pine sites, in forests where *Fomes annosus* attack is absent.

3097. KRŠTIĆ, M. Određivanje zdravstvenog stanja jedne preborne bukove sastojine. [**An investigation of the state of health of a selection-forest Beech stand.**] *Zaštita Bilja, Beograd* No. 2, 1950 (3–23). 2 refs. [Serb.serb.f.] L.B.A.

A detailed analysis of the state of health of pure stands of Beech found in 3 different areas of the state forest 'Istočna Boranja'. The trees are attacked almost exclusively by *Fomes fomentarius*, which damages heartwood. The appraisal of the state of health was carried out by examining trees on 10-m. strips taken through the stands in various directions, and rating each tree according to the severity of external symptoms [scale given]. The damage found was expressed as a % of total tree volume, in 5% classes. Methods enabling the amount of the damaged wood to be evaluated without making calculations for each diameter class, are discussed. It is claimed that the ratio between the number of damaged trees and that of the damaged wood provides the best measure of the health of a population. *From author's summary.*

3098. HUSSAIN, S. M. **A serious heart-rot fungus.** *Pakistan J. For.* 1 (4), 1951 (384–8 + 2 photos, 1 dgm.). 10 refs.

A brief account of *Fomes pinicola* is given and its presence in Pakistan recorded.

3099. AOSHIMA, T. **On the heart-rot fungus of Tôhi (*Picea hondoensis* Mayr).** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (89–95). 7 refs. [Jap.e.]

The rotted wood shows typical white pockets, similar to those in *Larix leptolepis* attacked by *Trametes pini*. Cultural studies showed the causal fungus to be identical with *Fomes jezoensis* isolated from *Picea jezoensis*. In cultures of the heart-rot fungus of Tôhi, of *F. jezoensis*, and of *T. pini* isolated in Japan and in Europe, the fungal mat of *F. jezoensis* was cottony with abundant aerial mycelia, while that of *T. pini* was felty with few aerial mycelia; mycelial growth of *F. jezoensis* was better at low temperatures than that of *T. pini*. Both fungi when cultured on agar media showed swellings of the mycelia; this has not been found in other species of *Fomes*, and the author suggests that the two fungi are closely related. *From author's summary.*

3100. KAMEI, S. **Brown cubical butt rots of *Abies sachalinensis* Schm. and *Picea glehnii* Mast. caused by *Polyporus balsameus* Pk.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (1), 1951 (151–66 + 6 photos). 19 refs. [Jap.e.]

P. balsameus, not previously recorded in Japan, was isolated from decayed wood of both the species.

3101. CARTWRIGHT, K. ST. G. ***Polyporus quercinus* on *Fagus sylvatica*.** *Repr.* from *Trans. Brit. mycol. Soc.* 34 (4), 1951 (604–6 + 1 plate). 2 refs. [Forest Products Research Laboratory, Princes Risborough.]

A description of the fungus (which was collected at Woodstock, England) and of the type of decay it causes in Oak and Beech.

3102. NICKELL, L. G. **A species of *Ganoderma* probably pathogenic to *Sassafras* in New York.** *Plant Dis. Reptr.* 36 (1), 1952 (28–9). 3 refs. A.P.B.

Decay and death of a large tree of *Sassafras albidum* in Brooklyn Botanic Garden is thought to be due to the activity of an unidentified species of *Ganoderma*. *Trichoderma viride*, which was also present, is thought to be a secondary invader.

3103. AKAI, S., and HEMMI, T. **Studies on a biological form of *Stereum frustulosum* causing white pocket rot of the dead wood of *Rhus succedanea*.** *Wood Res., Kyoto* No. 5, 1950 (15–29). 16 refs. [Jap.e.] 25 photos. X.

Study of a fungus causing pocket rot in dead heartwood of *R. succedanea* led the authors to conclude that it was a biological form of *S. frustulosum*, which commonly attacks dead stumps of Oaks.

Wilts, Diebacks etc.

3104. YOUNG, H. C. **Abstracts of reports on Oak wilt [*Chalara quercina*] studies by various agencies.** *Trees, Cleveland, Ohio* 12 (2), 1952 (6–7, 24–5, 30).

Summarizes briefly, without bibliographical citation, the results of a number of investigations into the cause, spread, and control of this disease.

3105. BARNETT, H. L. **A new method for quick determination of the Oak wilt fungus.** *Abstr.* in *Phytopathology* 42 (1), 1952 (1–2).

Chalara quercina can be quickly identified by placing infected Oak chips in a special agar medium composed of: glucose, 3 g.; phenylalanine, 0·5 g.; KH_2PO_4, 1 g.; $MgSO_4$, 0·5 g.; sulphates of Fe, Mn, Zn, each 0·2 mg.; biotin, 5 μg.; agar, 20 g.; distilled water, 1 litre. The pH should be near 6·0 and the temperature not over 25° C. On this medium the mycelium of *C. quercina* grows out from Oak chips after 3–5 days. Typical conidiophores and conidia are usually produced quickly near the chips, either on or under the surface of the agar.

3106. CURL, E. A., STESSEL, G. J., and ZUCKERMAN, B. M. **Macroscopic growth of the Oak wilt fungus in nature.** *Abstr.* in *Phytopathology* 42 (1), 1952 (6).

Growth of the fungus, as seen in the field, and its sporulation, closely resembled that on artificial media. The fungus was observed in the cambial region, and frequently grew along insect galleries.

Affected trees had been invaded by wood- and bark-borers of several species.

3107. BECKMAN, C. H., KUNTZ, J. E., RIKER, A. J., and BERBEE, J. G. **Plugging of vessels associated with Oak wilt development.** *Abstr.* in *Phytopathology* 42 (1), 1952 (3).

Rates of movement of liquid in xylem vessels of healthy and diseased northern Pin Oaks [*Quercus palustris*] were determined with solutions of radioactive rubidium ($Rb_2^{86}CO_3$). Movement was reduced by 90% in cases of incipient wilt, and by 99% in cases of severer wilt. Many tyloses occurred in wilting twigs. No important plugging of roots was observed. The results indicate that: (1) vessel plugging is a direct response of the host to infection; (2) such obstruction may limit the available water supply; and (3) this shortage may contribute to the leaf symptoms.

3108. KUNTZ, J. E., BECKMAN, C. H., and RIKER, A. J. **Oak wilt development in relation to time and place of inoculation and concentration of inoculum.** *Abstr.* in *Phytopathology* 42 (1), 1952 (13).

Root-inoculated northern Pin Oaks [*Quercus palustris*] (65,000,000 spores of *Chalara quercina* per tree) developed widespread incipient wilt in 3 weeks, regardless of the date of inoculation (23 May–6 Sept.). In 5 weeks severe wilt developed. Oaks inoculated in a low, lateral branch likewise developed incipient wilt in 3 weeks, but initial symptoms, and often the fungus itself were restricted to inoculated branches. Neither radioactive rubidium nor water moved through these wilting branches, although such movement was normal elsewhere. With the lateral-branch inoculations, wilt symptoms progressed unilaterally upward into the terminal. The entire crown wilted only after 7 weeks. Terminally inoculated Oaks also showed incipient wilt in 3 weeks and severe wilt after 7 weeks. Incubation periods increased as spore loads decreased. At low spore concentrations (6,500 to 65 spores per tree) branch-inoculated trees showed symptoms sooner than root-inoculated trees.

3109. BRETZ, T. W. **New hosts for the Oak wilt fungus, *Chalara quercina* Henry.** *Abstr.* in *Phytopathology* 42 (1), 1952 (3).

Greenhouse inoculation tests have proved that *Lithocarpus densiflorus*, *Castanopsis sempervirens Castanea sativa*, *Quercus acutissima* and *Q. dentata* are all susceptible to the fungus. Symptoms of attack are described.

3110. BRETZ, T. W. **Oak wilt fungus pathogenic to Chinese Chestnut.** *Plant Dis. Reptr.* 35 (1), 1951 (28). 1 ref. [Missouri Agricultural Experiment Station.] A.P.B.

Inoculation tests showed that *Chalara quercina* is a virulent pathogen of *Castanea mollissima*, and that transfer of the fungus from Oak to Chestnut may take place.

3111. SERVAZZI, O. **Brevi notizie sulla 'moria' o 'seccume' de nocciolo gentile delle Langhe. [Short notes on the die-back of Hazels in the Langhe region of Piedmont.]** *Nuovo G. bot. ital.* (*n.s.*) 57 (4), 1950 (1951), (678–82). [It.it.f.e.g.] A.P.B.

This dieback, which causes serious damage to Hazels, is probably due in the first place to insolation acting on young shoots, and secondarily to invasion of the injured tissues by *Cytospora corylicola*, which may kill the plant.

3112. THOMPSON, G. E. **Die-back of Sycamore.** *Plant Dis. Reptr.* 35 (1), 1951 (29–30). 1 ref. A.P.B.

Isolations and inoculation tests proved that a die-back of *Platanus occidentalis* occurring in Georgia is due to infection by *Diplodia natalensis*. Symptoms of attack are wilting and brown streaks in the woody tissue of branches and trunks.

3113. ITO, K., and KOBAYASHI, T. ***Physalospora paulowniae* sp. nov., causing dieback of *Paulownia* and its conidial stage, *Macrophoma*.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 49, 1951 (79–90). 25 refs. [E.e.jap.]

Laboratory cultures showed that the *Macrophoma* isolated from twigs of *P. tomentosa* is the conidial stage of *Physalospora paulowniae*, sp. nov., which is described.

3114. ITO, T. **White stem blight of trees in Japan.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (79–87 + 3 drawings). 10 refs. [Jap.e.]

Symptoms of white stem blight, attacking 37 Japanese species of 21 families, and the fungus causing it, are described. Morphological characteristics of the fungus suggest that it is a *Cytidia* sp. Mycelial growth is good at a temperature of 28° C. and is interrupted at 33°. It is stimulated by a small quantity of tannic acid. *From author's summary.*

Cankers, Stem Rusts etc.

See also No. 3538.

3115. PIRONE, P. P. **A bark disease of London Plane, Redbud and Sweetgum.** *Abstr.* in *Phytopathology* 42 (1), 1952 (16).

A highly virulent bark disease of *Platanus acerifolia* in New York City streets has been under investigation since 1947. Spore dilutions from pycnidia of a *Dothiorella* stage on infected bark, as well as plantings of discoloured inner bark and outer sapwood, have consistently yielded the same fungus. The perfect stage has never developed on artificial media. Wound inoculations show that this fungus is capable of infecting *Liquidambar styraciflua* and *Cercis canadensis* in addition to the London Plane. A culture of *Botryosphaeria ribis* from *C. canadensis* was also found to be pathogenic to the same three species. The two fungi, however, appear to be different when grown on potato-dextrose agar. Studies are in progress to find whether they are distinct species or strains of the highly variable *B. ribis*. [Cf. *For. Abstr.* 11 (No. 679).]

3116. BALDACCI, E., and ORSENIGO, M. **Chestnut blight in Italy.** *Phytopathology* 42 (1), 1952 (38–9). 1 ref. [Institute of Plant Pathology, University of Milan.]

Presents some data on the spread of *Endothia parasitica* in Italy. Cultural characters of isolates from different regions prove that the strains of the fungus found in Italy are the same as those found in

America and Asia. Perithecia formed by *E. parasitica* in pure culture are reported for the first time.

3117. KRSTIĆ, M. *Endothia parasitica* u našoj zemlji. [*E. parasitica* in our country.] *Zaštita Bilja, Beograd* No. 2, 1950 (113–6). 6 refs. [Serb.] L.B.A.

The first outbreak in Jugoslavia took place 'not long ago' at Fanovec, near Gorica, adjacent to the Jugoslav-Italian frontier.

3118. HEPTING, G. H., and CUMMINS, G. B. **A new species of *Peridermium* on Virginia Pine.** *Abstr.* in *Phytopathology* 42 (1), 1952 (10–1).

A new species, *Peridermium* (*Cronartium*) *appalachianum* was found on stems and branches of *Pinus virginiana* in Virginia, West Virginia, North Carolina, and Tennessee. A few trees have been killed by the rust, which forms cankers on the stem. No alternate host has been found.

Foliage Diseases

3119. SAWADA, K. **Researches on fungi in the Tohoku district of Japan (1). Erysiphaceae.** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 50, 1951 (97–140). [Jap.]

Lists 68 species with their hosts, and gives Latin descriptions of 15, mostly new species. There are indexes to the fungi and to their hosts, about 50 of these being tree species.

3120. JENKINS, A. E., and BITANCOURT, A. A. **Studies in the Myriangiales. III. Several little-known spot anthracnoses affecting trees.** *Abstr.* in *Phytopathology* 42 (1), 1952 (12).

Reports the following new anthracnoses: (1) on the upper surface of *Quercus falcata* leaves in Georgia; (2) on the upper surfaces of leaves of *Ulmus* sp. in Pennsylvania; and (3) on *Inga edulis* in Central America, affecting both the lower and the upper surface of the leaf-blade. A fourth disease affecting coffee berries in Central America is also described.

3121. COLE, J. R. **Control of tar spot of Holly (*Ilex*) by spraying in South Georgia.** *Plant Dis. Reptr.* 35 (9), 1951 (408–10). A.P.B.

Tar spot caused by *Phacidium curtisii* can be successfully controlled by sanitary measures (i.e. preventing overcrowding of trees, removing lower branches, and turning under diseased leaves when the ground is moist), and by spraying with Bordeaux mixture (for early applications) following by Phygon XL sprays.

3122. GIRGIDOV, D. JA. O zabolevanii kul'tur douglasovoĭ pikhty. [A disease of Douglas Fir plantations.] *Lesn. Hoz.* 3 (9), 1950 (86). [Russ.]

Records the first known occurrence, discovered in 1947, of *Phaeocryptopus gaeumanni* on 12- and 45-year-old Douglas Fir in Latvia.

3123. PŘÍHODA, A. *Naemacyclus niveus* (Pers.) Sacc., houba na borových jehlicích. [*N. niveus*, a fungus of Pine needles.] *Lesn. Práce* 29 (1/2), 1950 (30–2). 3 refs. [Cz.]

The author concludes from observations that *N. niveus* attacks almost exclusively *P. nigra* needles, at least in Czechoslovakia. It is suggested that this fungus is identical with *Lasiostictis fimbriata* Sacc. et Berles (previously *Stictis fimbriata*) found on *P. nigra* in Austria.

3124. PŘÍHODA, A. Dvě septoriosy lesních dřevin. [Two *Septoria* diseases of forest trees.] *Lesn. Práce* 29 (3/4), 1950 (85–9). 2 refs. [Cz.sz.f.]

Describes pathological changes in the leaves of *Robinia pseudoacacia* and of *Sorbus aucuparia* produced by *Septoria curvata* and *S. aucupariae* respectively.

444. VIRUS DISEASES

See also Nos. 3145–6.

3125. TOKUSHIGE, Y. **Witches'-broom disease of *Paulownia*: the study of some enzymes in diseased and healthy leaves.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (150–1). 7 refs. [Jap.e.]

Experiments reported in 1949 showed that the disease is caused by a virus. Studies on enzyme activity showed that in diseased leaves: (1) polyphenol oxidase activity is about 10% lower; (2) catalase activity is about 20% lower; (3) peroxidase activity is 2–3 times higher, than in healthy ones. *From author's summary.*

45. DAMAGE BY ANIMALS

451. *Mammals*

See also Nos. 2838, 2895, 2906.

3126. MORPETH, LORD. **Grey squirrel damage in Larch plantation.** *Quart. J. For.* 46 (1), 1952 (57 + 1 photo).

Extensive damage was done in May and June to a 9-year-old plantation of Japanese Larch. An adjoining plantation of European Larch of the same age was untouched.

3127. FRITZ, E. **More on bear damage: pack rats.** *J. For.* 49 (12), 1951 (917).

Some of the damage to Redwood trees attributed to bears [cf. *For. Abstr.* 13 (No. 2279)] is apparently due to pack rats (*Neotoma* sp.).

3128. SIEGMUND, D. Schälen des Rotwildes ohne Gefahr für den verbleibenden Bestand. [Bark stripping by red deer without danger to the rest of the stand.] *Forst u. Holz* 7 (2), 1952 (24–5). [G.]

Scraping of the bark of conifer stems from a height of ca. 0·50 to 2·0 m., in order to induce resin flow, proved a successful preventive against bark stripping by red deer. No permanent damage was suffered by the trees, and adequate fodder for the deer was provided by leaving a certain number of trees untreated.

3129. BUSSE, VON. Ist Schutzkratzen wirklich ein empfehlenswertes Mittel gegen das Schälen des Rotwildes? [Is protective scaling really a desirable method of preventing bark stripping by red deer?] *Forst u. Holz* 7 (5), 1952 (64–5). [G.]

A reply to Siegmund's article pointing out the dangers of bark stripping and recommending the use of a proprietary product—Synoxyd F—as a protective spray.

3130. MOULD, R. C. L. **Tree guards.** *Quart. J. For.* 46 (1), 1952 (40–2).

Instructions for making and erecting tree guards (1) for trees in parks etc., which are liable to damage by stock, and rabbits, and (2) for trees planted by streams, in hedgerows etc., where protection is required only from wind and vermin. Neither uses barbed wire.

452. *Birds*

See No. 2843.

453. *Insects*

See also Nos. 2751–2, 2881, 2912, 3051–3.

3131. Turček, F. Zpráva o výskyte lesných škodcov na Slovensku v roku 1947 a 1948. [**Report on the appearance of forest pests in Slovakia in 1947–8.**] *Lesn. Práce* 29 (1/2), 1950 (5–30). 15 refs. [Slovak.russ.e.]

3132. Głowacki, J. Wstępne materiały do zagadnienia roli brzozy w biocenozie leśnej. [**Preliminary material on the part played by Birch in the forest biocoenosis.**] *Sylwan* 95 (2), 1951 (214–9). 9 refs. [Pol.e.]

Lists the most common insects attacking Birch in Poland. Also enumerates parasitic insects living in the eggs, larvae, or pupae of both Birch and conifer pests (Pine and Spruce). Stresses the importance of Birch for the biocenosis of Pine and Spruce forests.

3133. Qadri, M. A. H. **Brief survey of the important forest pests of Pakistan.** *Pakistan J. For.* 1 (4), 1951 (368–71).

3134. Čerepanov, A. I. Nasekomye-vrediteli prirečnyh lentočnyh lesov Tuvy. [**Insect pests of the riparian forests of Tuva.**] *Lesn. Hoz.* 3 (9), 1950 (87–8). [Russ.]

Lists some of the primary and secondary pests found on *Larix sibirica*, *Populus laurifolia*, and *Salix* sp., in the fringing forests which extend far into the steppe in ribbons 50–500 m., and locally up to 2 km., wide. The most serious primary pest of the Larch appears to be *Dendrolimus sibiricus*, and of the hardwoods, *Lymantria dispar*, but many barkbeetles, wood-boring beetles and leaf-beetles also contribute to the damage, and some behave as primary pests.

Outbreaks of wood-boring beetles are favoured by the existence of overmature stands and stands in which uncontrolled fellings have left much breeding material. The only measures at present possible against these, are sanitation fellings plus barking and other methods of destroying the broods in infested material. More entomological research is urgently needed, since the maintenance of these forests in a region where wood is scarce, is of great importance.

3135. Hopping, G. R. **Timber types in relation to insect outbreaks in the Canadian Rocky Mountains.** *Repr.* from *81st Annual Report, Entomological Society of Ontario*, [*Toronto*], 1950 (72–5). 5 refs. (*Contr. Div. Ent. Dep. Agric. Can.* No. 2757).

Describes six types of stand in the Canadian Rocky Mountains, and discusses their susceptibility to certain types of insect attack. The most severe outbreaks occur in extensive stands of *Pinus contorta* var. *latifolia*, and the surest method of controlling them would seem to be to replace these pure, mature and overmature stands by a mixed type more closely resembling the climax.

3136. Thompson, W. R. [Editor], *et al.* **A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 1. Hosts of the Coleoptera and Diptera.** Commonwealth Institute of Biological Control, Ottawa, Ont., Canada. 1951. pp. ii + 147.

Cf. *For. Abstr* 13 (No. 1363).

3137. Györfi, J. Die Schlupfwespen und der Unterwuchs des Waldes. [**Parasitic Hymenoptera and forest undergrowth.**] *Z. angew. Ent.* 33 (1/2), 1951 (32–47). 29 refs. [G.g.]

The luxuriance of the ground flora is more important than the mixing of tree species for the reproduction of hymenopterous parasites. Where silvicultural aims allow, therefore, the forest flora should be kept as varied and rich as possible. Flowering plants in particular are important in the nutrition of the adults. The author lists the most important parasites of *Lymantria dispar* and *Diprion* spp. in the Hungarian forests, along with their secondary hosts and the food plants of the hosts, and also a list of the associated plants of the Hungarian Oak, Spruce, and Pine forests which are most important for the existence of the parasites. [Cf. *For. Abstr.* 8 (Nos. 982–3, 2736); 11 (No. 1767).]

3138. Györfi, J. Ujabb adatok a fürkészdarazsak biológiájának ismeretéhez. [**Recent information on the biology of parasitic Hymenoptera.**] *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (29–50). 11 refs. [Hu.g.russ.]

Observations indicate that the size of the population of parasitic Hymenoptera depends less on the mixture of tree species than on the presence of auxiliary species, shrubs and weeds, which serve as food plants for secondary hosts. Laboratory experiments show that preferred foods of the imagos of the Hymenoptera include sugar solution, fruit juice and honey. The planting of suitable nectar-bearing plants (*Daucus carota*, *Pastinace sativa*, *Medicago sativa*, and *Trifolium pratense* are mentioned) in and near the forest is recommended. *From author's summary.*

3139. Voûte, A. D. Zur Frage der Regulierung der Insekten-Populationsdichte durch räuberische Tierarten. [**The regulation of insect populations by predators.**] *Z. angew. Ent.* 33 (1/2), 1951 (47–52). 19 refs. [G.]

A discussion of the way in which insect epidemics may be regulated by the attraction of large numbers of predators to the site.

3140. Gösswald, K. Anlage einer Station zur Massenzucht von Königinnen der kleinen roten Waldameise. [**Setting up a station for large-scale breeding of *Formica rufa* queens.**] *Z. angew. Ent.* 33 (1/2), 1951 (77–104). 28 refs. [G.g.]

Describes a method of spreading and increasing colonies of *Formica rufa* by dividing up existing colonies, protecting them from predators, and breeding queens to populate the new colonies.

3141. MACKENZIE, J. M. D. **The encouragement of birds in commercial plantations by nest boxes and other means.** *Scot. For.* 6 (1), 1952 (10–7). 15 refs.

A paper read to the British Association in Edinburgh, 1951.

3142. BUCHHOLZ. Zur Verteidigung des Schwarzwildes. **[In defence of the wild boar.]** *Forst u. Holz* 7 (1), 1952 (8–9). [G.]

Analysis of stomach contents of wild boar, indicates their usefulness as destroyers of forest insect pests.

3143. KLEMM, M. Das Schwarzwild und die biologische Bekämpfung unserer Forstschädlinge. **[The wild boar and the biological control of our forest pests.]** *NachrBl. dtsch. PflSchDienst.* 5 (12), 1951 (231–3). 17 refs. [G.]

Reviews literature (mainly German) on the influence of wild boar in controlling forest pests.

3144. HARTLEY, G. S. **Chemistry of systemic insecticides.** Pest Control Ltd., Cambridge, England. 1951. pp. 7.

A paper delivered at the 9th International Entomological Conference.

3145. NICOL, J. **Systemic insecticides and the mealybug vectors of swollen-shoot virus of Cacao.** *Nature, Lond.* 169 (4290), 1952 (120). 1 ref. [West African Cacao Research Institute, Tafo, Gold Coast.]

Reports on preliminary trials of bis(bis-dimethylamino) phosphonous anhydride and bis(dimethylamino) fluorophosphine oxide, added to the nutrient solution in water cultures of Cacao. Control of the bugs was apparently good at certain concentrations.

3146. HANNA, A. D., HEATHERINGTON, W., and JUDENKO, E. **Control of mealybug vectors of the swollen shoot virus by a systemic insecticide.** *Nature, Lond.* 169 (4295), 1952 (334–5). [Pest Control Ltd., c/o W. African Cacao Research Institute, Tafo.]

Detailed field and laboratory experiments have been carried out to determine the effect of different systemic insecticides when applied to Cacao trees by spraying, tree injection, and soil treatment, on the mealybugs *Pseudococcus njalensis* and *P. citri*, the main vectors of the swollen-shoot virus. They have shown that *CR* 409, a systemic insecticide containing as main ingredient bisdimethylamino-fluorophosphine oxide, gave the best results when applied directly to the soil round the trunks of the trees in a shallow trench, at a dosage based on a girth/weight correlation which was used in all the experiments described. Five hundred trees naturally infested with mealybugs were treated and after 6 weeks it was found that infestation was reduced by 99·9%, and repeated treatments at intervals of 8 or 12 weeks kept the population at a very low level. Soil treatment with this insecticide did not significantly affect pollinating insects or the various insect parasites and predators of the mealybugs.

3147. HEIDENREICH, E. Das Gamma-Hexachlorcyclohexan im Forst. **[γBHC in the forest.]** *Z. angew. Ent.* 33 (1/2), 1951 (321–8). 17 refs. [G.]

A survey of results obtained to date in Germany with this insecticide.

3148. BÖTTCHER, F. K. Die Gefährdung der Bienen durch den Pflanzenschutz. **[Danger to bees through pest control.]** *Z. angew. Ent.* 33 (1/2), 1951 (348–58). Numerous refs. [G.]

A review based on world literature.

3149. HABER, A. Badania nad wpływem arsenianu wapnia na kręgowce. **[Investigations on the effect of $Ca_3(AsO_4)_2$ on vertebrates.]** *Lesn. Práce* 29 (7/8), 1950 (278–89). [Pol.cz.]

During large-scale control operations, in 1948, against *Acantholyda nemoralis* in Poland, carried out on 17,300 ha. using ca. 25 kg./ha. $Ca_3(AsO_4)_2$ preparations of high or medium As content, the effect of this insecticide on the forest vertebrate fauna and on domestic animals was investigated. Small forest mammals seem to be the least affected. Cattle, and especially poultry, suffered much more (particularly turkey-hens). By far the greatest number of poisoning cases were among birds, in the following order of increasing % incidence. Paridae, Fringillidae, Sylvinae, Muscicapidae.

Isoptera

See also No. 2896.

3150. **Termite eradication.** *Rep. For. Div. Sudan 1949*, 1950 (29).

In tests with Gammexane at Katire, effective lethal treatments proved to be (*a*) 1 lb. of a mixture of 3 parts Gammexane crystals to 10 parts sorghum flour, and (*b*) one pint of a mixture of 1 part Gammexane LG 140 and 10 parts of paraffin. In both cases a hole was driven into the summit of the termite mound and the whole mixture poured in. Experiments with smaller quantities are continuing. [Cf. *For. Abstr.* 13 (No. 2288).]

Thysanoptera

3151. VITÉ, J.-P. Schadauftreten des Lärchenblasenfusses *Taeniothrips laricivorus* Krat., auch im Sauerland. **[Occurrence of damage by *T. laricivorus* in Sauerland.]** *Forst u. Holz* 7 (1), 1952 (5–8). [G.g.]

This pest, until recently known to cause serious damage only in Czechoslovakia and bordering areas, has now been discovered in Sauerland, where its depredations are impeding height growth of Larch, particularly in 15-year-old mixed stands. Notes on its biology and the type of damage are given, with results of control measures tried to date. It is particularly important, in areas subject to infestation, not to grow Larch in a tree-by-tree mixture, but in group mixtures, so as to prevent domination of the Larch by the other species. [Cf. *For. Abstr.* 7 (No. 429); 13 (No. 1372).]

Hemiptera

See also Nos. 2753–4, 2788–9.

3152. ***Carulaspis* [*Diaspis*] *visci* on Cedars [*Juniperus bermudiana*].** *Rep. Dep. Agric. Bermuda 1949*, 1950 (11–4).

Several new predators were released. The most promising appears to be a *Telsimia* sp. from California. The general condition of the Cedars has further deteriorated, probably as a result of drought.

3153. **Biological control of *Diaspis visci* on Cedars [*Juniperus bermudiana*].** *Rep. Dep. Agric. Bermuda 1948*, 1949 (13–6).

[Cf. *For. Abstr* 11 (No. 2299); 13 (No. 3059).] The most effective of the introduced predators was *Lindorus lophanthae*, which is now well established.

3154. SCHMUTTERER, H. Zur Lebensweise der Nadelholz-Diaspidinen (Homoptera, Coccoïdea, Diaspididae, Diaspidinae) und ihrer Parasiten in den Nadelwäldern Frankens. **[The life history of conifer Diaspidinae and their parasites in the conifer forests of Franconia.]** *Z. angew. Ent.* 33 (1/2), 1951 (111–36). 21 refs. [G.g.]

Ecological and biological observations on: *Diaspis visci*, *Lepidosaphes newsteadi*, *L. ulmi bisexualis*, *Leucaspis löwi*, *L. candida*, *Syngenaspis parlatoriae*, *Dynaspidiotus abietis*, and on some Chalcididae which parasitize them. The only effective control by the parasites is that exercised by *Aphytis mytilaspidis* and *Azotus pinifoliae* on *Leucaspis candida*.

3155. TROPIN, I. V. Vreditelj lesa—sosnovaja hvoevaja ščitovka. **[A forest pest—the Pine needle scale *Leucaspis signoreti*.]** *Lesn. Hoz.* 3 (8), 1950 (84–5). [Russ.]

In 1949, outbreaks of a scale insect later identified as the rare and very little known species *Leucaspis signoreti*, were discovered in Pine woods in the Cherkasski Bor, Kiev Province. The outbreaks, on two separate areas, covered respectively 10 and 175 ha. Brief descriptions of the adults and larvae are given, with notes on what is known of the life history, which resembles that of other *Leucaspis* species infesting Pine. It is unknown in what stage the insect overwinters. The flight of the ♂s occurs in spring, and there are probably two generations a year in this region. As many as 70 scale insects may be found on a single needle. The infested needles gradually yellow and then fall, the attack proceeding outwards from the inner crown. Initial attacks are usually limited to 2- to 3-year-old foliage, but in mass outbreaks the younger foliage also is heavily attacked. Infested trees show seriously reduced growth, fail to develop normal cones, and may die if they are growing in relatively unfavourable conditions. The foci of the outbreaks were in pure Pine plantations on dry, sandy soils. Trees in moist depressions were not attacked. It is thought that control might be achieved by spraying with mineral-oil emulsions, the best time for which would be when larvae are in their first instar, the most susceptible stage. Slash from fellings should be burnt and the creation of mixed instead of pure stands should be considered.

Lepidoptera

See also Nos. 2755–7.

3156. DUMBLETON, L. J. **A new genus of seed-infesting micropterygid moths.** *Pacific Science, Honolulu* 6 (1), 1952 (17–29). 18 refs. E.M.B.

Describes two species of micropterygid moth, one found in seed of *Agathis vitiensis* from Fiji, and the other in seed of Queensland Kauri (*Agathis* spp.), belonging to the new genus *Agathiphaga* and named *A. vitiensis* and *A. queenslandensis* respectively. Notes on their life history are presented.

3157. VEER, E. J. VAN A. DE, and SUDIRO, M. **Observations on the attack of *Zeuzera coffeae* Nietn. on Balsa.** *Tectona* 43 (2), 1951 (137–9). [E.]

A young plantation of *Ochroma lagopus* was so severely attacked by this borer that it had to be felled. Details of the infestation and damage are given.

3158. PETERSON, L. O. T. **Development and control of the Ash borer in the Prairie Provinces.** Division of Forest Biology, Department of Agriculture, Ottawa. 1951. pp. 4.

Brief account of life history, habits, and control of *Podosesia fraxini*.

3159. STARK, R. W. **Parasitism of the Lodgepole needle miner [*Recurvaria milleri*].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (6), 1951 (3).

A survey made in Yoho Park showed that 98% of larvae of *R. milleri* were parasitized, and an account is given of 7 species of parasite and one hyper-parasite. The period of activity of these parasites suggests that the life histories, of some at least, conform to that of the needle-miner. If this is so, a carry-over of this portion of the parasite complex cannot be expected, as the needle-miners available for parasitization are in their 2nd or 3rd instar. All the parasites described were recovered from mature larvae or pupae that are out of phase with the main body of the infestation. Histological examination of 2nd- and 3rd-instar larvae disclosed the presence of immature parasites, which supports the theory that the life histories of some of the parasites conform to that of the needle-miner. The perplexing problem of the occurrence of these mature larvae in the odd year, with their high incidence of parasitization, remains to be solved. [Cf. *For. Abstr.* 13 (No. 2294).]

3160. KLINKOWSKI, M., and NOLTE, H.-W. Knospenwickler als Schädlinge der Eberesche. **[Bud moths as pests of Rowan.]** *NachrBl. dtsch. PflSchDienst.* 5 (11), 1951 (212–3). 2 refs. [G.]

Describes briefly an attack by *Argyroploce variegana* and *Tmetocera ocellana* on *Sorbus aucuparia* growing near affected Apple trees.

3161. KOLOMIEC, N. G. **O vrede pihtovoĭ šiškovertki. [Damage [to Siberian Fir seed] by *Evetria margarotana*.]** *Lesn. Hoz.* 3 (10), 1950 (80). [Russ.]

Though *E. margarotana* has long been recognized as a pest of Siberian Fir cones, little is known of its biology or of the extent of the damage caused. The flight period is the second half of June, and the eggs are laid usually on young rudimentary cones. The larva, on hatching, eats through the soft portion of the scale and eventually reaches a seed, after which it feeds on the seeds one after another, moving alone the cone axis. Generally there is a solitary larva per cone. At the end of August pupation takes place in the forest litter. Detailed study is difficult because Siberian Fir bears cones in quantity only at the very top of dominant trees over 28 cm. in diameter, and the cones fall to pieces at maturity. Contrary to statements in some textbooks, that abundant seeding occurs every 2–3 years, the author's observations in W. Siberia over the period

1940–47 show only one good seed year (169 cones per tree in 1947; 6–4 in the remaining years). From an examination of 54 cone-bearing trees, ca. 100 years old, felled in 1947 on two sample plots in the Magalinsk forest, it is estimated that an average of 14% of the seed crop had been destroyed by *E. margarotana*, and on some trees 80% of the cones were infested. In a poor seed year the whole seed crop might well be destroyed.

3162. HELLER, R. C., BEAN, J. L., and MARSH, J. W. **Aerial survey of Spruce budworm damage in Maine in 1950.** *J. For.* 50 (1), 1952 (8–11).

Describes an experiment in line-strip visual reconnaissance using a Cessna high-wing monoplane with no obstructing struts and capable of carrying 5 persons. Light defoliation of Balsam Fir (as low as 15% of current growth) was detectable when flying at 90–100 miles/hr. at a height of 200 ft. Navigation was by reference to landmarks, and when the plane flew over the landmarks, which were numbered on the map, the pilot recorded the appropriate number in Morse code by using a keyboard connected with the operation recorder. This recorder has 20 electrically operated pens that can be used separately or together to make a record on a moving chart; each of the two observers (one on each side of the plane) had a keyboard connected with some of these pens, which were used for different records—e.g. pens 1 and 15 for 'No defoliation', pens 2 and 16 'continuous defoliation' etc. A map showing the extent and locations of Spruce-budworm damage was prepared from the charts. Some 10,000,000 acres were surveyed in this way in 2½ weeks during 44 hours of flying time, of which 22 hours were spent on the flight lines; 4,500,000 acres were found to have continuous or scattered budworm defoliation.

3163. MORRIS, R. F. **One source of error in budworm population work.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (6), 1951 (1–2).

The work of examining foliage for egg masses is extremely tedious, and some eggs are missed even by experienced workers. Analyses of data from check examinations of 100 bags of foliage, are summarized and discussed. The proportion of eggs missed varies from less than 15% for experienced workers in plots where egg populations are high to 25% or more for workers who have not previously been subjected to checking. Contrary to popular opinion, women are not more efficient than men at this type of work. The % of eggs missed varies significantly with the population level. Where the population was less than 20 eggs/sq. ft. of branch surface, the miss varied from 25 to 40%; at 50/sq. ft. the miss was slightly less than 10%. It is believed that these errors would be much greater if it were not known that the foliage would be subjected to a check examination.

3164. HENSON, W. R. **Mass flights of the Spruce budworm.** *Canad. Ent.* 83 (9), 1951 (240). 2 refs. [Forest Insect Laboratory, Sault Ste. Marie] *Contr. Div. For. Biol. Dep. Agric. Can.* No. 12). C.R.S.

Notes on times of mass flights of *Cacoecia fumiferana* and the meteorological conditions accompanying them.

3165. RENNELS, R. G. **The Zimmerman Pine moth (*Dioryctria zimmermani* Grote)—a potentially serious enemy of Pine plantations in Illinois.** *For. Note Ill. agric. Exp. Sta.* No. 30, 1951. pp. 3.

Species attacked include *Pinus sylvestris*, *P. nigra* var. *calabrica*, *P. densiflora*, *P. resinosa*, *P. ponderosa*, *P. strobus*, *P. banksiana* and *P. nigra* var. *austriaca*.

3166. GRIO, M. La lucha biológica contra el bicho de cesto y la posibilidad de su empleo. **[Biological control of *Oiketicus kirbyi* and its possibilities.]** *Cienc. & Invest., B. Aires* 7 (5), 1951 (195–202). 7 refs. [Span.] A.P.B.

Notes on the biology and parasites of *Oiketicus kirbyi*, an important pest of fruit trees, Willow, and Poplar, in Central and South America, with a discussion of the possibilities of biological control.

3167. KOLUBAJIV, S. Význam vaječných cizopasníků jako přírodních činitelů tlumících kalamitní rozvoj bourovce borového. **[Significance of egg parasites as natural factors controlling the *Dendrolimus pini* outbreak.]** *Lesn. Práce* 29 (5/6), 1950 (182–7). 8 refs. [Cz.russ.e.]

During the 1949 outbreak of *D. pini* in Pine stands of various age classes in Bohemia, ca. 60% of the eggs of the second generation were found to be parasitized by *Telenomus* (*Teleas*) *laeviusculus*. Despite the high degree of parasitization, the larvae hatched from sound eggs could have completely denuded the stands, were it not for ground and aerial spraying with DDT.

3168. GÄBLER, H. Kritische Raupenzahlen des Kiefernspinners. **[Critical larval numbers of *Dendrolimus pini*.]** *Forstwiss. Cbl.* 68 (4), 1949 (254–6). 4 refs. [G.]

Tabulates figures showing for different tree diameters the critical number of larvae per tree and per sq. m. on site classes I, III, and V, on the assumption that each larva consumes 25 g. of needles during its life.

3169. PATOČKA, J. Píd'alka *Cheimatobia brumata* L., vážný škůdce jasanů na Slovensku. **[*C. brumata*, an important pest of Ash in Slovakia.]** *Lesn. Práce* 29 (9/12), 1950 (479–83). [Slovak.russ.f.]

An illustrated description of *C. brumata*, which, in 1949, appeared in two places in Slovakia, viz. an Ash nursery (altitude 250 m.) where 31,800 seedlings were defoliated on an area of 1,500 sq. m., and a stand of 20-year Ash (altitude 900 m.) where 200 ha. were completely defoliated.

3170. PATOČKA, J. Můra *Xanthia sulphurago* —škůdce na javorech. **[*X. sulphurago*—a pest of Maples.]** *Lesn. Práce* 29 (1/2), 1950 (1–5). [Cz.russ.f.]

Observations in Slovakia show that the young larvae devour the apical buds of *Acer campestre* and *A. platanoides* in the second half of April or early in May. The pupa is formed in the soil late in May, the imago lives from August to October; the eggs overwinter. This pest is widely spread in Czechoslovakia. The larvae are very sensitive to DDT.

The author has found that this species is accompanied by *X. citrago* and *X. aurago*; the latter species has been supposed to be confined to Beech.

3171. Nikiforuk, K. S., and Sedaševa, G. Ja. Pričiny usyhanija dubrav v Baškirii. [**Causes of the dieback of Oak woods in the Bashkir A.S.S.R.**] *Lesn. Hoz.* 3 (10), 1950 (60). [Russ.]

Outlines the course of outbreaks of *Lymantria dispar* in the forest-steppe zone of the Bashkir A.S.S.R., since a mass outbreak in 1936–7, when hardwood stands were locally completely defoliated and the larvae turned their attention to herbaceous growth, including wheat. Several years of medium infestation followed. In 1940–42 mass reproduction of the pest again occurred, but in 1943 polyhedral disease of the larvae became fairly widespread, and in 1944, aided by parasites (chiefly tachinids), it wiped out the infestation so completely that only a few larvae were discovered the next year, and in 1946–7 none. Egg counts made in 1941 on sample plots in practically pure Oak stands, showed that where little understorey or shrub layer existed, egg clusters were confined to the tree trunks, while in stands with an understorey of Oak, Maple and Lime, plus a dense shrub layer of Hazel, Cherry, Spindle and Hawthorn, eggs were laid on both trees and shrubs. Nevetheless, the total number of eggs per ha. is estimated at 19·5 million for the former and only 3 million for the latter. The maximum number of egg clusters per tree was 130. Eggs averaged 380 per cluster. It is noted in concluding that a severe outbreak of *Malacosoma neustria* occurred in the Bashkir A.S.S.R. in 1949–50.

3172. Milosavljević, R. Neki podaci o poslednjem kalamitetu gubara u NR Srbiji. [**Some data on the recent outbreak of *Lymantria dispar* in Serbia.**] *Šumarstvo* 4 (2), 1952 (133–5). [Serb.]

Gives data on affected areas and degree of infestation in 1947–50, and on the estimated damage to forest and fruit crops, in terms of money, in 1947–49.

3173. Vasić, K. Rezultati pregleda lutaka gubara (*Lymantria dispar* L.) u 1948 godini. [**Results of analysis of *L. dispar* pupae in 1948.**] *Zaštita Bilja, Beograd* No. 2, 1950 (25–34). [Serb.f.] L.B.A.

Presents the final results of an analysis of 62,956 pupae of *L. dispar* gathered in Jugoslav forests in 1948. Out of this number, 23,374 were ♂, 33,682 ♀, and 5900 of undetermined sex. The number of parasites found increased from the early to the late stages of the life cycle. The ♀ was much more attacked by parasites than the ♂, particularly in the case of large parasites of the Tachinidae (Sarcophaginidae), to which most of the parasites belonged. Hymenoptera were hardly represented at all. *From author's summary.*

3174. Nolte, H.-W. Parasiten der Nonne (*Lymantria monacha* L.) in Sachsen 1937–1941. [**Parasites of *L. monacha* in Saxony 1937-41.**] *Forstwiss. Cbl.* 68 (3), 1949 (183–8). 16 refs. [G.]

Lists and discusses 6 species of Tachinidae, 6 of Ichneumonidae, 2 of Braconidae and one of Chalcididae. Of these, *Parasitigena segregata* was the most important.

3175. Groschke, F. Nonnenbekämpfung mit neuzeitlichen Mitteln. [**Nun-moth control with modern methods.**] *Z. angew. Ent.* 33 (1/2), 1951 (359–68). 5 refs. [G.g.]

Operations against *Lymantria monacha* in the Aschaffenburg district in 1948 showed that 5% DDT dusts at ca. 53 kg./ha. applied during the second instar gave an average kill of 98·2%. BHC was only successful where conditions were favourable. DDT mists applied from ordinary aircraft had good effects on Pine and deciduous stands, but were not really effective on Spruce. In the Weiden district, Pine stands with a light Spruce understorey were successfully treated with a 'Tifa'-type ground fogging apparatus (Lister Todd, London), using DDT in oil. One kg. pure DDT/100 m. progress of the apparatus gave nearly 100% kill of second-instar larvae at a distance of 200 m. from the apparatus. On the average 1 kg. DDT/ha. gave 92·6% kill. Comparative dusting with 5% Gesarol (i.e. 2·5 kg. pure DDT/ha.) gave about 91·9% total kill. Fogging with the 'Tifa' apparatus killed about 95% of third-, fourth- and fifth-instar larvae. [Cf. *For. Abstr.* 12 (No. 1615).

3176. Burič, J. O razvoju in zatiranju pinijevega sprevodnega prelca na Krasu. [**Spread and control of *Thaumetopoea pityocampa* in the Karst.**] *Gozd. Vestn.* 9 (5/7), 1951 (144–8). [Sloven.]

On the basis of field observations conducted in 1949–50, it is claimed that larvae are the only stage of *T. pityocampa* vulnerable to chemical insecticides; in Slovenia the best time to apply these is in autumn, from mid-September onwards. Large (hand or power) sprayers should be used. It is also recommended that large numbers of parasitized pupae should be introduced into places where there are few parasites. Finally, adult insects can be destroyed by making use of their phototropism: powerful lamps are lighted after sunset, and wooden sticks coated with glue are placed round them.

Coleoptera

See also Nos. 2758–60, 3051, 3418, 3436–8.

3177. Takahasi, Y., and Ito, C. **Trap-log experiments with insect pests of Pine [*Pinus thunbergii*] in Mizubayashi State Forest.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (159–61). [Jap.e.]

The investigation was made in *P. thunbergii* protection forest along the sea coast from April 1949 to October 1950. Five species of Ipidae, 4 of Curculionidae, 3 of Cerambycidae and 1 of Buprestidae were caught. Adults, larvae and pupae of *Ips proximus* and *Cryphalus fulvus* were found overwintering together; of the Curculionidae and Cerambycidae, mostly larvae. The following data were obtained for *Ips proximus:* (1) They attacked the log at latest 45–50 days after it was set up. (2) The maximum number of borers found in a unit area of 100 sq. cm. was 9·5 and the average 2·5. (3) The maximum length of tunnel bored by an adult was 226 and the minimum 25 mm. (4) The maximum number of eggs laid in one tunnel was 79 and the minimum 0. (5) The maximum hatching % was 94, the average 56 and the minimum 0. *From authors' summary.*

3178. SWAINE, G. **Population studies on *Hylobius abietis* (L.) (Coleoptera, Curculionidae).** *Ann. appl. Biol.* 38 (3), 1951 (606–14). 4 refs. O.R.E.

Stump sampling for overwintering 3rd-stage larvae of *H. abietis* was carried out in Bagshot woods, Surrey, where 40-year-old *Pinus sylvestris* had been felled in three different periods, viz. Oct. 1947, Jan. 1948, and July 1948. Studies of populations in 1- and 2-year-old stumps, estimates of variations in populations in 1-year-old stumps, and comparisons of populations in stumps and roots were made. Stumps were also sampled for pupae and adults, and an attempt was made to assess fluctuations in the number of adults by trapping and marking. The 1-year-old stumps formed more important breeding sites than the 2-year-old, the degree of infestation in the former depending on the time they had been exposed to oviposition. The rate of egg laying is slow and the period protracted. The main brood of weevils does not appear until early July, and, since oviposition ceases in late autumn, it would seem that the weevils which hibernate in the soil, and are found from April onwards, are important in building up the mass populations that follow extensive felling. The most reliable estimate of absolute numbers was obtained from the stump-sampling data.

3179. WAUTHOZ, V. La lutte contre l'hylobe est entrée dans sa phase decisive. **[Control of *Hylobius abietis* has reached a decisive stage.]** *Bull. Soc. for. Belg.* 59 (1), 1952 (1–14). [F.]

Further data are given on the use of billets, bark, or bundles of brushwood soaked in a solution of E 605 to attract and poison *H. abietis* [cf. *For. Abstr.* 12 (No. 3433)]. The weevils are strongly attracted by this poison, and it has been found possible to rid plantations of them in this way. Costs worked out at ca. Fr.200/ha. in Belgium. The best season for operations is 15 April–20 June. E 605 is equally attractive and destructive to a number of other insects, particularly *Hylastes cunicularius*.

3180. GYÖRFI, J. Szúkár osítások a hazai lúcfenyvesekben. **[Barkbeetle damage in our Spruce forests.]** *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (384–400 + 8 photos). 15 refs. [Hu.g.russ.]

An analysis of the damage in different parts of Hungary in recent years, mainly by *Ips typographus*, *Pityogenes chalcographus* and *Polygraphus polygraphus*, with recommendations for control. *From author's summary.*

3181. BECKER, G. Ausdehnung und Ablauf der *Dendroctonus*-Kalamität in Guatemala. **[Extent and course of the *Dendroctonus* outbreak in Guatemala.]** *Z. angew. Ent.* 33 (1/2), 1951 (186–209). 24 refs. [G.g.]

Presents notes on the conifer forests and on the extent and intensity of the *Dendroctonus* attack as ascertained from expeditions made in 1951. *Dendroctonus* has been a primary pest for 25 years in the Guatemalan forests, where it regularly destroys *Pinus rudis*, and occasionally *P. pseudostrobus*; *P. ayacahuite* remains untouched. The most destructive species is *D. adjunctus*; next come *D. mexicanus* and *D. parallelocollis*. Causes of the outbreak resemble those in other countries, but in Guatemala heavy mortality, partly due to the action of coleopterous predators, sets in comparatively early, with a consequent slowing-up of the rate of spread. No natural termination to the outbreak can be expected, but if the necessary control measures could be carried out, the slow course of the outbreak should allow of good results.

3182. WHITESIDE, J. M. **The Western Pine beetle [*Dendroctonus brevicomis*], a serious enemy of Ponderosa Pine.** *Circ. U.S. Dep. Agric.* No. 864, 1951. pp. 11. 2 refs.

Life history, habits, damage and control.

3183. GERNECK, R. Maikäferbekämpfung mit modernen Geräten. **[Cockchafer control with modern apparatus.]** *Anz. Schädlingsk.* 24 (8), 1951 (113–6). [G.]

Describes technique and a programme of control for *Melolontha melolontha* during the flight season, with three types of 'Borchers' motorized dusting and spraying apparatus.

3184. WOELFLE, M. Maikäferbekämpfung mit modernen Geräten. **[Cockchafer control with modern apparatus.]** *Anz. Schädlingsk.* 24 (12), 1951 (182–3). [G.]

Notes on the preceding article, with a request for further technical data about the apparatus used.

Hymenoptera

See also Nos. 2838, 3439.

3185. FERRIÈRE, C. **A new genus of Pteromalidae (Hym.) parasitic on the Alder wood-wasp, *Xiphydria camelus* L., found in Norfolk, England.** *Ent. mon. Mag.* 87 (1051), 1951 (322–4).

The new genus, *Xiphydriophagus*, belongs to the group which the author has named Cheiropachinae, all of which are parasites of wood-boring larvae. The type species, *X. meyerinckii*, is described.

3186. THALENHORST, W. Versuche zur Bekämpfung der kleinen Fichtenblattwespe. **[Control of *Pristiphora abietina*.]** *Forst u. Holz* 7 (4), 1952 (49–51). [G.]

Attacks of *Pristiphora abietina* have become intensified in Germany of late years, the centre of infestation being the Weser-Ems-Münster area. Both direct and indirect methods of control were tried out in the administrative district of Cloppenburg, but it was found that dusting, fogging, and spraying, reduced populations only temporarily. Attempts to render the litter and raw-humus layer unfavourable for the development of the cocoons by adding lime, seemed to bring a slight but steady decrease in numbers, but further investigations of the biocoenosis are needed in order to find suitable methods for silvicultural control.

3187. **[A pest of *Podocarpus neriifolius*.]** *Rep. For. Adm. Malaya 1950*, 1951 (15).

Many young trees in experimental plantations of *P. neriifolius* suffered from the attacks of a shoot-boring ant (*Crematogaster* sp.). This ant appears

to be a primary pest, each colony inhabiting a single tree in which it makes numerous subsidiary nests by hollowing out both leading and lateral shoots. Attack results in checked growth, distortion of the stem, and forking. Spraying with BHC and with E 605 was ineffective. Wood-boring species of *Crematogaster* are very common in Malaya, but most of them colonize and enlarge the borings of other insects in fallen brushwood and do little or no harm.

459. *Other Animals*

3188. **New miticides.** *Shade Tree* 24 (12), 1951 ([4]–[5]).

A short account of 4 proprietary compounds: TEPP (tetraethyl pyrophosphate), Parathion (generally available as a dust containing 1% parathion or a wettable powder containing 15% parathion), Dimite (a liquid containing 25% di *p*-chlorophenyl methyl carbinol), and EPN 300 (a wettable powder containing 27% ethyl *p*-nitrophenyl thionobenzene phosphate).

3189. HOVEY, C. Y. **Artificial control of the Spruce spider mite, *Paratetranychus ununguis* Jac.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 7 (6), 1951 (3).

Good results were obtained by spraying with Ovotran 50W, C.1014 (Pestox 3), Lindane, Chlordane, and Toxaphene. Aldrin and Aramite were somewhat less effective; Parathion, BHC, and EPN 300 were relatively ineffective. [Cf. *For. Abstr.* 13 (No. 509).]

46. DAMAGE TO TREE GROWTH BY MAN

See Nos. 2731, 3051.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

3190. CAMPBELL, W. A. **Vertical distribution of *Phytophthora cinnamomi* in the soil under littleleaf diseased Shortleaf Pine.** *Plant Dis. Reptr.* 35 (1), 1951 (26–7). 2 refs. A.P.B.

Thirty-one samplings were made to a depth of 28 in. under 28 trees. The fungus was most abundant at 2–3 in. depth. Its frequency fell rapidly to a low point at 6–7 in. then rose again towards 8–9 in. Even at a depth of 12 in. it occurred to a limited extent. [Cf. *For. Abstr.* 13 (No. 1412).]

3191. COPELAND, O. L. **Root mortality of Shortleaf and Loblolly Pine in relation to soils and littleleaf disease.** *J. For.* 50 (1), 1952 (21–5). 10 refs.

The sizes, condition, and distribution of Shortleaf and Loblolly Pine roots in the top 12 in. of five soils in the Piedmont Plateau were studied by the use of square-foot transect counts. The % of dead roots by age and condition classes of trees are as follows: young healthy Loblolly 3·7, young healthy Shortleaf 2·9; older healthy Loblolly 6·3, older healthy Shortleaf 18·0, and older littleleaf Shortleaf 34·4.

There appears to be a critical percentage of dead roots, somewhere between 18 and 34%, beyond which a tree cannot continue normal growth and begins to decline. Shortleaf feeding roots are most abundant in the upper few inches of soil, while Loblolly roots are fewer in number and larger in size, are more deeply distributed, and show greater ability to penetrate heavy soils. Mean diameters for Shortleaf and Loblolly roots at various depths are given.

The data derived from this study indicate that mortality of roots less than ¼ in. in diameter is of great importance in influencing the decline of Shortleaf Pine trees. Porosity [determined by a tension-table method] and volume weight of soils appear to exert the greatest influence on root distribution, with the most roots occurring at depths having the highest porosities and the lowest volume weights, but no correlation was found between root mortality and several soil properties studied. It appears from the associated work of Campbell [cf. *For. Abstr.* 11 (Nos. 661–2, 2326)] that a pathogenic root fungus, *Phytophthora cinnamomi*, may be responsible for the high root mortality of the small roots of littleleaf trees. *From author's summary.*

3192. JACKSON, L. W. R. **Influence of littleleaf on quality of Shortleaf Pine seed.** *Phytopathology* 42 (1), 1952 (57–8). 1 ref.

Tests of seed from littleleaf-infected *Pinus echinata* showed that there was a marked decrease in size of cones, size of seed and viability of seed from littleleaf trees, and also that, in viable seed, germination was slow.

3193. BULL, R. A. **A new gall disease of *Sequoia sempervirens*.** *Gardeners' Chronicle, London (Ser. 3)* 130 (3376), 1951 (110–1). O.B.D.

A study of a gall disease not previously recorded in England, on *S. sempervirens* at Eastbourne. The galls seemed to have been formed at nodes and varied from small swellings about 1 cm. in diam. to large structures 15 cm. in diam. The bark on a branch bearing galls was usually smooth and dark greyish- or purplish-brown. At the base of the tree severe galling had defoliated and killed the branches. Dieback of leaves from the action of a needle-cast fungus was also observed, but no fungus was isolated from gall tissue, nor was any associated insect found. Inoculations with bacterial colonies obtained from gall tissue have so far produced no result.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

See also No. 2718.

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

3194. URBANOVSKI, A. Šumarski rotor-logaritmar. **[A forester's circular logarithmic calculator.]** *Šum. List* 75 (7), 1951 (263–8). [Croat.e.]

An illustrated description of a circular 12·5-cm.-diam. logarithmic calculator (with tree names in Croatian) enabling the following calculations to be made: (1) multiplication and division; (2) sectional area from diameter, and vice versa; (3) sum of sectional areas for different diameters and numbers of stems, giving simultaneously the volumes of cylinders (logs); (4) diameter of the average stem of the stand from the b.a. and the number of stems in the stand; (5) volume of standing trees, from d.b.h. and height, for Beech, Oak, Spruce, Silver Fir, *Pinus sylvestris* and *P. nigra*; and (6) approximate volume per ha. for even-aged pure high forest of Beech, Pine, Silver Fir, and Spruce, from average stand height and density.

521. *Diameter (Girth) and Sectional Area*

3195. PATTERSON, A. E., and COLSON, J. H. **The effect of compass direction on the measurement of diameter breast high of Shortleaf Pine.** *J. For.* 50 (1), 1952 (31). 3 refs.

Measurement of more than 1,000 Shortleaf Pines confirmed previous observations; namely, that the average diameter of trees is smaller in a N.–S. than in an E.–W. direction. This was true for all diameter classes, but the differences were not statistically significant, being $\frac{1}{10}$ in. or less.

3196. FERGUSON, J. H. A. Optische grondvlakbepaling volgens de methode Bitterlich. **[Optical estimation of stand basal area by Bitterlich's method.]** *Tectona* 41 (1), 1951 (56–62). 4 refs. [Du.e.]

[Cf. *For. Abstr.* 12 (No. 2483).] The use of the method in tropical forest is likely to be limited by the fact that undergrowth and ground vegetation are usually more than breast high.

3197. GROSENBAUGH, L. R. **Plotless, timber estimates—new, fast, easy.** *J. For.* 50 (1), 1952 (32–7). 2 refs.

An exposition of Bitterlich's *Winkelzahl* method of ascertaining basal area by means of the Relascope.

3198. SEIP, H. K. Relaskopet. **[The Relascope.]** *Tidsskr. Skogbr.* 60 (1/2), 1952 (22–6). 6 refs. [Nor.]

Describes and discusses this instrument and tabulates the results of its use experimentally for measuring basal area per ha. in Prestebakke forest.

522. *Height, Length*

3199. HORNIBROOK, E. M. **Tree-height chart for topographic level.** *Misc. Pap. Calif. For. Range Exp. Sta.* No. 6, 1951. pp. 2 + 1 gph.

The chart attached is designed to provide a graphic solution of tree-height measurements, when using the topographic Abney scale and slope distance measured in chains and links. An example of its use is given.

3200. MAKAROV, N. I. Majatnikovyĭ vysotomer. **[A pendulum hypsometer.]** *Lesn. Hoz.* 3 (10), 1950 (83–4). [Russ.]

Describes and illustrates with a line drawing, a hypsometer designed by the author and tested, with satisfactory results, in 1949. The instrument, built in chromium-plated steel, consists essentially of a right-angled sector, a pendulum with a fixing device, and a sighting-tube mounted along one radius of the sector. The arc has two scales graduated to show height in metres when the observer is 10 or 20 m. distant from the tree. The pendulum is held firm against the face of the sector, at any point in its swing, by means of a small coil spring mounted in a sleeve (on the opposite face of the sector) through which the pivot of the pendulum passes; a press-button on this side of the instrument moves the pendulum out of contact with the sector-face into the free-swinging position. The sector measures 10 × 8 cm. and is of 1·5-mm. metal. For use, the hypsometer is held with the right-hand thumb in a notch at the end of the arc and the forefinger on the sighting-tube. The pendulum is freed by operating the press-button with the left forefinger; when it steadies, the press-button is released smoothly and the reading is taken with the pendulum in the fixed position. On level ground and at 10 or 20 m. from the tree, it is only necessary to add height at eye-level to the reading obtained on the appropriate scale. At other distances tree height is obtained by adding the eye-level height to the following:—(1) at 30 m., the sum of the readings on both scales; (2) at 40 m., twice the reading on the 20-m. scale; (3) at an odd number of m., the product of that number of m. and $\frac{1}{10}$ the reading on the 10-m. scale. Best results are obtained when the distance is equal to or a little more than the tree height. On slopes: (*a*) When the base of the tree is above eye-level, determine the horizontal distance to the tree; take readings on the top and bottom of the tree and deduct the latter from the former to obtain tree height. (*b*) When the tree base is below the observer's position—as (*a*), but take the reading to the tree base with the instrument reversed, i.e. with the eye at the 'objective' end of the sighting-tube, and add the two readings so obtained. In neither case should height to eye-level be added.

523. *Bark*

See also No. 2881.

3201. TUJI, T. **Some studies on Todomatsu (*Abies mayriana* Miyabe et Kudo).** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (57–9). [Jap.e.]

The relationships of bark thickness and bark % to d.b.h. are shown in graphs; bark thickness varies directly, and bark % indirectly, with d.b.h. The variation of form factor with diameter and height is

shown in graphs, comparing real values and those from formulae.

524. *Determination of the Volume of Trees and Stands*

524.1. Principles of Volume Determination. Form (Taper)

See also Nos. 2881, 3201, 3204, 3208, 3211.

3202. WILHELMI, T. Der Stand der Forschung über die Schaftform tropischer und subtropischer Holzarten. [**The state of research on the stem-form of tropical and subtropical species.**] *Z. Weltforstw.* 14 (1/2), 1951 (30–5). 12 refs. [G.e.f.]

Discusses literature, especially von Wülfing's formulae for determining the stem form of tropical and subtropical species. [Cf. *For. Abstr.* 11 (No. 1511).]

524.3. Volume of Tree Groups and Stands

3203. KRENN, K. Tarife zur Massenberechnung von Beständen. ['**Tariffs' for calculating stand volume.**] *SchrReihe bad. forstl. VersAnst.* No. 6, 1948. pp. [2] + 47. [G.]

Simplified volume tables for even-aged stands of Birch, Beech, Oak, Alder, Ash, Poplar, Spruce, Pine and Silver Fir, in Germany.

3204. LAER, W. VON, and SPIECKER, M. Massenberechnungstafeln zur Ermittlung von Vorrat und Zuwachs von Waldbeständen. [**Volume tables for determining growing stock and increment in forest stands.**] J. D. Sauerländers Verlag, Frankfurt a.M. 1951. pp. vi + [1] + 102. [G.] Price *DM*12·60.

Contains, with supplementary notes on construction, practical use, and accuracy: (*A*) Improved volume tables for Beech, Oak, Norway Spruce, Scots Pine and Silver Fir, based on extensive data collected by German, Austrian and Swiss research stations, giving for each species—(1) A table showing, against each combination of height and d.b.h. of the mean tree of the stand, a single figure (in cu.m. standing volume) which is the common number of the appropriate series for use in either of the two succeeding tables, viz. (2) 'volume series', giving the unit volume for multiplication by the stem count to obtain the volume of the diameter gradation concerned; and (3) 'form-height series', giving the form height for multiplication by the total b.a. of the diameter gradation to obtain its volume. Tables (2) and (3) are alternative methods and give identical results in cu.m. of *Derbholz* (timber down to 7 cm. top diam.). Auxiliary tables are provided in appendices, giving (*a*) total basal area against diameter gradation and number of trees; and (*b*) the % addition to be made for smaller wood when tree volume is required as well as *Derbholz* volume. Table (1) is linked up with Krenn's 'tariffs' and can be used as a volume 'tariff', with *estimated* height values, when height measurements are lacking or inadequate for tables (2) and (3).

(*B*) Auxiliary tables for use in estimating increment as present volume minus the sum of previous volume and fellings (the latter converted to standing measure). For this purpose, broad comparability of present and previous volume data for the stand is assured by calculating present volume with the same series number (from table (1)) as that used for calculating the previous volume. This, however, fails to account for any change in the trend of the form-height curve. Appropriate correction factors for present volume are therefore tabulated in this section—(*a*) for stands over 70 years old, based on the increase in stand age, and (*b*) for younger stands, based on the increase in diameter of mean tree, since the previous enumeration.

3205. NÄSLUND, M., and HAGBERG, E. Skogsforskningsinstitutets större tabeller för kubering av stående träd: tall, gran och björk i södra Sverige. [**The Swedish Forest Research Institute's larger tables for estimating the volume of standing trees: Pine, Spruce and Birch in S. Sweden.**] Statens Skogsforskningsinstitut, Experimentalfältet, Sweden. 1950. pp. [2] + 8 + 200. [Sw.E.]

Over- and under-bark volume tables for all three species. English translations of the preface, explanations and instructions, and table headings, have been added in mimeograph to the Swedish version.

3206. BRANTSEG, A. Kubikk- og produksjonsundersøkelser i vest-norske granplanteringer. [**Investigations on volume and yield in Spruce plantations in W. Norway.**] *Medd. Vestland. forstl. Forsøkssta.* 9 (1) (Ser. No. 28), 1951. pp. 109. 59 refs. [Nor.e.]

Reports in detail on the data collected for and the methods used in constructing the provisional tables presented, viz.: (1) A volume table (o.b.) for d.b.h. 5–50 cm. in 1-cm. gradations and heights of 5–33 m. in 1-m. gradations. (2) Yield tables for quality classes I to V, covering stand ages ranging from 20–80 years in the first, to 30–100 years in the last, and based on a single thinning grade—that in general use in the region, described as very light but not a pure low thinning.

A preliminary attempt is also made at a classification of the site quality of planting sites using ground vegetation as the main criterion, but taking account also of soil, gradient and moisture, and type of tree growth if present.

There is an 18-page English abridgement, and all legends of the numerous figures and tables are given in English.

3207. CANCIO MORENZA, G. Tablas volumétricas de árboles tipos de *Pinus insignis* Doug. en el norte de España. [**Volume tables of representative trees of *P. radiata* in northern Spain.**] [*Bol.*] *Inst. for. Invest. Exp. Madrid* 22 (59), 1951. pp. 15. [Span. g.e.f.]

New tables based on measurements of 2272 trees. [Cf. *For. Abstr.* 4 (p. 196).]

3208. BICKFORD, C. A. **Form-class volume tables for estimating board-foot content of northern conifers.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 38, 1951. pp. 33.

Comparison of measured values with values obtained from the Mesavage-Girard volume tables [see *For. Abstr.* 9 (No. 619)] shows that these are not reliable for northern conifers and cannot easily be adjusted. New volume tables showing bd.-ft. volumes for the northern conifers (Red Pine, White

Pine, Spruce, Fir, Hemlock and Cedar) of average taper and of form-classes 65–86, based on Girard's form-class definition of d.u.b. at the top of the first log, are given.

3209. CLAUSER, F. Tavole stereometriche dell'abete bianco e del faggio per la foresta demaniale di Campigna. **[Volume tables for Silver Fir and Beech from the state forest of Campigna.]** *Ital. for. mont.* 6 (6), 1951 (318–9). [It.]

Cf. *For. Abstr.* 12 (No. 2471).

3210. VINCENT, G., KORSUŇ, F., and ZAVADIL, Z. Porostní a hmotové tabulky pro topoly. **[Yield and volume tables for Poplars.]** *Lesn. Práce* 29 (5/6), 1950 (214–46). 9 refs. [Cz.cz.russ.f.]

After reviewing the various yield and volume tables, mainly for Aspens, published during the period 1846–1947, the author concludes that Tjurin's yield tables (Moscow, 1931) and Krüdener-Orlov's volume tables are best suited for Aspen stands in Czechoslovakia. These tables have been recalculated by the authors, where necessary.

3211. LAAR, A. VAN. Een oriënterend onderzoek naar de nauwkeurigheid van de opstandsmassa-bepaling volgens de methode van Hohenadl. **[A preliminary investigation of the accuracy of stand volume determination by Hohenadl's method.]** *Ned. Boschb.-Tijdschr.* 23 (12), 1951 (302–13). 5 refs. [Du.g.]

Gives results from a trial of Hohenadl's method [cf. *For. Abstr.* 12 (Nos. 803–4)] on 16 stands of Scots Pine and 1 of Douglas Fir in Holland, with the following conclusions: (1) Height measurements should not be distributed over all diameter gradations but concentrated on trees with diameters approximating to those of the two Hohenadl mean trees ($d-$ and $d+$). For a mean height error of 1% ca. 100 trees must be measured in stands over 30 years old, and more in younger stands. (2) For calculating the true form factor, which has the advantages of being independent of d.b.h. and height (though not, in the present material, of age), any trees having diameters between $d-$ and $d+$ may be used. For an accuracy of 1%, ca. 36 trees must be measured sectionally in stands over 30 years old, and 50–60 in. younger stands. (3) To obtain the form quotient with the same degree of accuracy, 50–60 and 100–200 stems must be measured in stands respectively over and under 30 years old. (4) With a 1% error in height and form quotients of the mean trees, and in the true form factor, the resulting mean error in stand volume is 1·3%. (5) The method is time-consuming and is not recommended for thinning studies. For cases in which accuracy of volume assessment is the foremost requirement, it is superior to other sample-tree methods and to estimation with volume tables.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also Nos. 2984, 3245–6.

3212. ILVESSALO, Y. Uuden valkakunnan metsien arvioinnin ensimmäinen vaihe. **[The first phase of the third national forest survey of Finland.]** *Metsät. Aikak.* 1951 (12), (322–6). [Fi.e.]

The survey was started during June 1951. Distances between the survey lines are 13 km. for most of the country, rather more in the north and less in the south. Primary sample plots $\frac{1}{10}$ ha. in area, are measured, at 1-km. intervals along the survey lines, and secondary sample plots of the same size, spaced midway between primary plots, are studied mainly in respect of their larger timber trees. Sixteen survey groups, each with 6 members, carried out the work. About 8480 km. of the survey line, $\frac{1}{3}$ of the total, were measured. A number of increment cores were taken and plant samples were collected. The field work should be completed in 3 summers.

3213. ECKERT, K. H. Untersuchungen über die Eignung und Anwendung statistischer Methoden als Hilfsmittel forstlicher Inventuren. **[Studies on the suitability and application of statistical methods as aids in forest inventories.]** *Mitt. Bundesanst. Forst- u. Holzw.* No. 24, 1951. pp. iv + 99. 106 refs. [G.]

A dissertation accepted by the University of Hamburg, containing an exposition of literature on the statistical basis of modern sampling methods and their application to forest inventories, with a brief appreciation of the need for such methods under the conditions of Central Europe.

3214. JOHNSON, F. A., and HIXON, H. J. **The most efficient size and shape of plot to use for cruising in old-growth Douglas-Fir timber.** *J. For.* 50 (1), 1952 (17–20).

A study conducted in Oregon has indicated that a 1 × 3-chain ($\frac{3}{10}$-acre) rectangular plot is the most efficient size and shape of sample plot to use for intensive cruising in this type of stand. In general, rectangular plots were more efficient than circular, and $\frac{1}{5}$- to $\frac{1}{4}$-acre plots were more efficient than either larger or smaller ones. Among circular plots, the $\frac{1}{4}$-acre size was best.

3215. GAISER, R. N. **Random sampling within circular plots by means of polar co-ordinants.** *J. For.* 49 (12), 1951 (916–7).

3216. JEFFERS, J. N. R. **Use of range/standard-deviation tables.** *Forestry* 25 (1), 1952 (66–8).

Standard deviations of random samples drawn from normal populations may be estimated rapidly in the field from the ratio, range/standard deviation. A simple table of these ratios is given, together with a table showing the loss in precision involved in the method, and the increased sizes of samples needed to compensate for this loss. *Author's summary.*

3217. STRAND, L. Feilberegning i forbindelse med skogtaksasjon. **[Calculating error in forest mensuration.]** *Tidsskr. Skogbr.* 59 (6), 1951 (195–209). 9 refs. [Nor.]

Discusses various formulae for calculating standard error. Corrections to two of the formulae are given in *Tidsskr. Skogbr.* 59 (11/12), 1951 (412–3).

525. *Volume by Assortments. Merchantable Volume*

See also Nos. 3097, 3249.

3218. FRASER, A. R. **Preliminary site-class volume tables by logs as an aid to grade-cruising**

Douglas Fir, Western Hemlock, and Western Red Cedar. *Res. Notes B.C. For. Serv.* No. 19, 1951. pp. 19.

3219. SMITH, R. C. **Measuring White Oak stave bolts.** *J. For.* 50 (1), 1952 (38).

An assortment table for cooperage staves from White Oak is constructed.

3220. BRINKMAN, K. A., and KRAJICEK, J. E. **Natural mortality and cull in Bigtooth Aspen stands in northeastern Iowa.** *Sta. Note Cent. St. For. Exp. Sta.* No. 69, 1952. pp. 2.

A study of 50- and 80-year unmanaged stands of *Populus grandidentata* from 1948 to 1951 showed a rapid decline in the numbers of living and of sound trees per acre from 50 years onwards.

526. *Log Measurement. Scaling*

3221. MAEDA, Y. **A physical study on the accuracy of formulae for estimating the log volume of deciduous trees.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (55–7). 5 refs. [Jap.e.]

Measurements of Oak and other hardwoods were made by xylometer, and were compared with results obtained by 6 standard formulae. Results are given in graphs and tables with English captions.

3222. GÖTHNER, K. H., HAAGEN, T., and HANSSON, A. Ett försök till virkesmätning medelst fotogrammetriska metoder. **[An investigation on timber-measurement by photogrammetric methods.]** *Norrlands SkogsvFörb. Tidskr.* 1950 (2), (88–100). [Sw.]

A small-scale experiment was made in measuring piled logs from photographs taken from two points on each side of the pile. The following results were obtained: (1) Length measurements were sufficiently accurate, with a mean error of $\pm$ 0·9 cm. (2) Diameter measurement could be made on only some of the logs, others being poorly-lit or completely in the shadow. Accuracy was unsatisfactory, with errors of up to 3 or 4 cm. With better lighting and measurement u.b. only, satisfactory results might be obtained. (3) No satisfactory estimate of timber quality could be obtained. (4) It is doubtful whether much time would be saved by this method on small piles. [Cf. *For. Abstr.* 9 (No. 2603), 11 (No. 1521).]

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC)

3223. MATUSZ, S. Nowy przyrząd do rzutowania koron. **[A new instrument for measuring crown projection.]** *Sylwan* 95 (1), 1951 (139–42). [Pol.pol.russ.]

Describes an apparatus, of the author's design, for the projection of tree crowns. It consists of 1 plane mirror, an 11-cm. circular convex mirror, a sighting aperture, and a plumb-line device on a telescopic rod. It is claimed that a skilled operator can trace on the ground 20–25 tree crowns an hour with this apparatus.

3224. WILSON, F. G. **Control of growing stock in even-aged stands of [pure] conifers.** *J. For.* 49 (10), 1951 (692–5). 9 refs.

The author first summarizes his arguments in favour of using height rather than diameter as a factor in determining stand density [cf. *For. Abstr.* 8 (No. 2812)], and then discusses the use of 'bole area' (cambial surface) instead of basal area as a measure of growing stock [cf. *For. Abstr.* 13 (No. 530)]. He concludes that both conceptions are particularly valuable for the determination of thinning intensities in even-aged stands, and illustrates their use in the thinning of a young plantation of *Pinus resinosa* at 30 and 35 years of age. Both thinnings were to a spacing of 20·6% of height and left 22,400 sq. ft. of bole area.

3225. CEDILLO, V. H. Procedimiento para la determinación de las existencias normales en montes de clima templado y frío—preliminares de ordenación. **[A procedure for determining normal stocking in forests of temperate to cool climates—preliminaries to drawing up working plans.]** *Mem. 3a Conv. Asoc. nac. Prod. Mad. Pino, Durango* [1950?] (97–114). [Span.]

Expounds a method of using a curve [not shown] of crown cover per tree related to d.b.h. as a means of assessing the density of a stand.

54. ASSESSMENT OF SITE QUALITY

See also Nos. 2737–8, 2989, 3206, 3231, 3240, 3345.

3226. WILDE, S. A., PAUL, B. H., and MIKOLA, P. **Yield and quality of Jack Pine pulpwood produced on different types of sandy soils in Wisconsin.** *J. For.* 49 (12), 1951 (878–81). 11 refs.

Tabulates and discusses the following data taken from 47 sample plots on different soils (aeolian sands, melanized sands, podzolic sands, gley-podzolic sands, and moss peat): average state of fertility factors in soils of different types; average growth of Jack Pine pulpwood on different soils; physical and chemical properties of Jack Pine wood produced on different soils; solid volume, weight, and content of α-cellulose of Jack Pine pulpwood produced on different sites, calculated on a per-cord and per-acre basis. [Cf. *For. Abstr.* 13 (No. 3345).]

55. AGE DETERMINATION

3227. **Discs of *Boswellia serrata* (*Salai*).** *Rep. For. Res. Madhya Pradesh 1949/50*, 1951 (16 + 3 photos).

Examination of discs of a large number of saplings of known age confirmed previous findings that it is not possible to distinguish true and false growth rings in *B. serrata*.

3228. WILHELMI, T. Beitrag zum Problem: Wachstum und Zuwachs im Tropenwald. **[The problem of growth and increment in tropical forest.]** *Z. Weltforstwirt.* 15 (1), 1952 (9–15). 23 refs. [G.m.f.]

A review of literature on calculating increment in the tropics.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 2886, 2888–9, 2964, 2989 *et seq.*, 3228.

3229. BOUDRU, M. Accroissement et délivrance dans la forêt jardinée. [**Increment and yield in selection forest.**] *Ann. Gembl.* 56 (4), 1950 (169–79). [F.] A.P.B.

Discusses errors and the degree of precision necessary in inventories, the distribution of increment, the influence on production of diameter-class distribution, the relationship between yield and increment, and the variations in this relationship according to the size of the diameter classes.

3230. MITSCHERLICH, G. Über den Einfluss der Wuchsgebiete auf das Wachstum von Kiefernbeständen. [**The influence of locality on the growth of Pine stands.**] *Forstwiss. Cbl.* 68 (4), 1949 (193–216). [G.]

Gives graphs and tables, based on figures from local yield tables and actual measurements, showing the relationship between locality (including different parts of Germany, Austria, Sweden, Poland, Russia and England) and height, basal area, form factors, diameter, and basal area and volume increment.

3231. WILHELMI, T. Wachstum und Massenproduktion gleichaltriger Reinbestände von *Cedrus deodara*, *Pinus excelsa* und *Pinus longifolia* verglichen mit den Wuchsleistungen von *Pinus silvestris* in Deutschland. [**Growth and volume yield of pure even-aged stands of Deodar, Blue Pine and Chir, compared with Scots Pine in Germany.**] *Mitt. Bundesanst. Forst- u. Holzw.* No. 25, 1951. pp. 7 + [6]. 15 refs. [G.e.f.]

Basing his computations on tables published by the Indian Forest Service and on Wiedemann's figures for Scots Pine, the author compares the growth, stand form factors and yield of the 4 species on the lines laid down in his previous studies [cf. *For. Abstr.* 13 (No. 1444)]. The height and diameter increment and the volume yield of the Himalayan conifers far exceed those of the best Scots Pine stands. If compared on the basis of Weck's 'absolute height quality', however, Blue, Chir and Scots Pines having the same mean stand height produce approximately the same weights of dry wood substance, but Deodar continues to show much higher figures than any of the Pines and also surpasses Teak and Sal.

561. *Increment in Height, Diameter, Basal Area, Form and Quality; Variations and Trends; Dendrochronology*

See also Nos. 2851–2, 2886, 2996, 3302–3.

3232. HAUGBERG, M. Høydevekst hos furu og sommertemperatur. [**Height growth of Pine and summer temperatures.**] *Tidsskr. Skogbr.* 59 (7/8), 1951 (247–53). 4 refs. [Nor.nor.]

Measurements of height growth were made over periods of 8 to 29 years on old (120–140 years) and young (12–20 years) trees in different parts of Norway. The results, shown in graphs and tables, are compared with figures for rainfall and temperature. Measurements of young trees showed considerable variation in height growth from year to year, and a good correlation between these variations and the temperatures of the previous summer. On shallow soils, there was some evidence that height growth is also influenced by rainfall in the spring of the growth year. A certain but less clear correlation was also found between height growth of older trees and (*a*) the temperatures of the previous summer, (*b*) rainfall during the winter and spring of the growth year.

3233. BREHME, K. Jahrringchronologische und -klimatologische Untersuchungen an Hochgebirgslärchen des Berchtesgadener Landes. [**Research on growth-ring chronology and climatic data for mountain Larch in the Berchtesgaden area.**]. *Z. Weltforstwirt.* 14 (3/4), 1951 (65–80). 43 refs. [G.g.e.f.]

Annual-rings were measured on increment cores from 35 trees and on timber from derelict alpine huts, giving a chronological range from 1522 to 1947 and from 1340 to 1842 respectively. The work was complicated by the absence of a number of annual rings; the cause of this absence could not be determined, but the number of missing rings increases with tree age and size, and with decreasing annual-ring breadth. On the basis of some 21,000 measurements, a graph showing the chronology of annual-ring breadth from 1340 to 1947 is given. Good correlation was found between the general tendencies of fluctuations in growth and known climati changes. Comparison of available data shows a correlation between temperature and annual-ring breadth for years with maximum or minimum ring breadth. A study of the effect of sun-spot cycles gave no positive results.

3234. EIKLID, O. Årring-gransking: gran (*Picea abies*) frå Halling-Høvreslia i Gol. [**Annual ring measurement: Spruce from Halling-Hovreslia, Gol.**] *Tidsskr. Skogbr.* 60 (1/2), 1952 (1–12). [Nor.]

Annual-ring measurements were made on 6 Spruces from Halling-Høvreslia, and the curves obtained (covering the years 1695–1934) were compared with each other and with those from material from other parts of the country. Fairly good correlations were obtained among the 6 trees and between them and the other material, and it is concluded that even so little material as 6 trees can give reliable results.

3235. SPEIDEL, G. Die Schneidersche Konstante: eine Untersuchung über die Brauchbarkeit der Schneiderschen Formel zur Bestimmung des Massenzuwachsprozentes im stehenden Holz an Hand von 70 Stammanalysen der europäischen Lärche. [**The Schneider constant: research on the validity of the Schneider formula for determining the volume-increment percent in standing timber, on the basis of 70 stem analyses of European Larch.**] *Forstwiss. Cbl.* 68 (3), 1949 (161–83). 27 refs. [G.g.]

The average value of the Schneider constant for Larch is 602, with a deviation of $\pm$ 28%; it is not, therefore, sufficiently accurate for the practical calculation of volume increment %. The relationship of the constant to yield class, age, height

increment, diameter form increment, and annual-ring breadth is discussed. [Cf. *For. Abstr.* 12 (No. 3502).]

3236. PRODAN, M. Die Bestimmung des Massenzuwachses von Beständen mit Hilfe des Massenzuwachsprozentes. **[The determination of the volume increment of stands from the volume increment percent.]** *Forstwiss. Cbl.* 68 (5), 1949 (292–9). [G.g.]

Discusses, with examples, the use of Schneider's % formula in determining stand volume increment.

562. *Volume Increment*

See also Nos. 2870–1, 2881, 2883, 2888, 2896, 3204, 3226, 3228, 3235–6, 3252.

3237. MAEDA, Y. **On the growth of Todomatsu (*Abies mayriana*) planted in N. Hokkaido.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (92–4). [Jap.e.]

Stem analyses of 30-year Todomatsu show that (1) c.a.i. in height and d.b.h. reach a maximum at 20–25 years and have not yet crossed the m.a.i. curve; volume c.a.i. is still increasing and has presumably not yet reached a maximum; growth lags for 5–6 years after planting.

3238. CAPRAI, D. Quanto puo fruttare un robineto? **[How much can a Robinia stand produce?]** *Monti e Boschi* 3 (1), 1952 (37–8). [It.]

Gives some figures for a 5-year-old stand of *Robinia pseudoacacia* near Pistoia which showed a m.a.i. of 11·1 cu.m./ha. and had yielded poles, staves, firewood etc. worth Lire 158·3/ha. or Lire 31·66/ha./year.

3239. ETTER, H. Beitrag zur Leistungsanalyse der Wälder. **[The analysis of forest production.]** *Schweiz. Z. Forstw.* 103 (1/2), 1952 (12–29). [G.f.]

The main part of this article presents and discusses data derived from studies of the relative productivity of Beech, Silver Fir and Spruce in mixed stands (*Fagetum typicum* and *Abieto-Fagetum*) in Switzerland. In the *Fagetum typicum*, a 120-year-old Beech had only 80% of the volume, but 120% of the dry substance of a Silver Fir of the same age; in the *Abieto-Fagetum* the corresponding figures were 50% and 70%. Spruce was intermediate between the other two species in both types. Mean production (both volume and dry substance) per ha. occupied by each species in the *Fagetum typicum* was calculated and the figure for Spruce was 80% and for Beech 65% of that for Silver Fir; in the *Abieto-Fagetum* the corresponding figure was 75–78% for Spruce, and 34–45% for volume and 67% for dry weight for Beech. It is evident that in these stands a reduction in the area of Beech would result in an increased total production; it is considered that the area of Beech might safely be reduced to 40% in the *Fagetum typicum* and 20% in the *Fageto abietum*. Silver Fir is preferable to Spruce, both for its greater production and for its more beneficial effect on the soil.

566. *Yield Tables and Their Construction*

See Nos. 3206, 3210.

569. *Increment; Development and Structure of Stands: Miscellaneous*

3240. FILZER, P. **Die natürlichen Grundlagen des Pflanzenertrages in Mitteleuropa. [The natural foundations of plant yields in Central Europe.]** E. Schweizerbart'sche Verlagsbuchhandlung (Erwin Nägele), Stuttgart. 1951. pp. viii + 198 + 3 sketchmaps. 92 refs. [G.] Price *DM*17·60 [£1. 12*s.* 6*d.*]

The theme of this book is the possibility of using plant growth, measured as total yield of dry substance ('*TSP*'), to express the productivity of a district or region in a single figure reflecting the sum of the effects of its site factors. The variations of TSP values with geographical location, and their temporal variations on one and the same area, should prove to be correlated with variations in climate and weather, soils, biotic influences, and altitude. The only considerable body of data available for such a study is offered by statistics for agricultural (including pasture) and forest crops. Most of the present work is devoted to an attempt—considered to have met with a useful degree of success—to test the validity of such correlations in Germany, using mainly agricultural crop statistics but including also reference to forest yields where some measure of comparability could be deduced. A final chapter reviews possible practical applications of the results, and includes tentative maps of Germany showing phytoclimatic divisions based on the evidence assembled.

58. SURVEYING AND MAPPING (INCLUDING AERIAL SURVEYS)

581/584. *Ground Surveys*

3241. MIRKOVIĆ, D. Instrumenat za direktno merenje horizontalnih dužina na kosom terenu. **[An instrument for the direct measurement of horizontal lengths on sloping ground.]** *Glasn. šum. Fak., Beograd* 2, 1951 (71–85). [Serb.f.]

An attempt at determining the horizontal distance between two points by means of a simple plumb-bob protractor which dispenses with the usual measurement of lengths and their reduction to the horizon. This it does by direct readings from specially prepared nomograms, based on trigonometrical formulae (both of which are given). No final design of the instrument is indicated. It is suggested that it can be applied to dendrometry.

585/588. *Aerial Reconnaissance and Survey*

See also No. 3162.

3242. OLENIUS, L. **Ilmakuvat Pohjois-Suomen metsätaloudessa. [Aerial photographs in the forestry of N. Finland.]** *Metsät. Aikak.* 1951 (1), (25–6). [Fi.e.]

Results of work already done (including work on volume estimation) are promising. Expenses have been reduced by 50% through the saving in field work. A wider application to forest inventories and administration is likely.

3243. PALMANS, K. Een voorbeeld van interpretatie van luchtfoto's van oerwoud: het Malili-complex op Celebes. **[Interpretation of aerial photographs in a virgin-forest complex, Malili, Celebes.]** *Tectona* 41 (2), 1951 (111–36). [Du.e.jav.]

Comparison of air photographs (scale 1 : 10,000) with data from ground observations led to the following results: It was possible to trace the boundaries of forest types with fair accuracy on air photographs and, from crown density, to make a rough classification by stocking and constitution. Identification of tree species was not generally possible, but *Anthocephalus macrophyllus* and *Campnosperma* sp. could be identified. Crowns separately visible on the photographs belonged as a rule to trees of merchantable size; trees whose crowns were not visible contributed little to total timber volume. A fairly strong correlation was found to exist between crown diameter and stem diameter, and it was possible to represent the relation between tree volume and stem diameter fairly accurately by a straight line on double logarithmic paper.

3244. SKÄRBY, R. G. Ett försök att praktiskt utnyttja Kartverkets flygfotomaterial för skogskartläggning. **[A trial of the use in practice of the Survey's air photographs for forest mapping.]** *Norrlands SkogsvFörb. Tidskr.* 1950 (1), (39–49). [Sw.]

The air photographs (scale 1 : 10,000), covered by tracing paper on which the actual writing was done, and with contours added from contour maps supplied with them, were used as a basis for the addition of information on species, age class, stand density and site class in a survey of ca. 30,000 ha. in Helsingland. The total cost per ha. was estimated at Kr.1·16 as against Kr.2·29 for ordinary methods.

3245. BRUNSON, F. D., and JENSEN, C. E. **Controlled sampling for aerial-photo timber cruises.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 66, 1951. pp. 3.

Presents formulae and a table applying to hardwood stands in the Central States region, for calculating the number of plots needed to ensure sufficient accuracy.

3246. MOESSNER, K. E., and JENSEN, C. E. **Timber cruising on aerial photos.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 126, 1951. pp. 27.

Describes the technique of estimating areas and volumes from air photographs and concludes that: (1) the method will furnish reliable area and gross volume estimates without additional forest mapping; (2) reliable estimates of gross volume per acre can be determined without costly ground work; (3) the method is usable in small surveys of less than 640 acres as well as in state-wide inventories; and (4) maps needed by the forest manager can be prepared in the detail needed without affecting the accuracy or cost of the aerial volume estimates. The method is limited as regards precise measurement of individual trees, estimation of cull, and identification of individual species. Allowance for cull in the estimates of total volume, and distribution by species or diameter classes, can be determined by limited field samples.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also Nos. 3220, 3224, 3254.

3247. SILVY-LELIGOIS, P. La forêt productive. **[The productive forest.]** *Rev. for. franç.* 1952 (1), (13–40). [F.]

A discussion of the general principles of forest management.

3248. KOROLEFF, A., *et al.* **Stability as a factor in efficient forest management.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 89 (*A*–2–*a*), 1951. pp. 294. 65 refs. Price $4·00.

Divided into three sections: (1) forest labour management; (2) forest management; and (3) planning for increased stability and efficiency in the use of forest labour and forest areas. Section (2) contains 19 papers by American, Canadian and European foresters on the principles and effects of sustained-yield operations. The book also contains analyses of the annual logging cycle for a number of companies operating by the normal methods and that have recently changed from winter to all-the-year-round logging. Conclusions drawn are that all-the-year-round logging, increased mechanization, a permanent, efficient labour force, continuous operation of forest units as against 'nomadic' logging, and the integration of logging with silviculture and protection, are desirable to ensure maximum production in E. Canada.

3249. ŠČERBAČEV, V. D. Vozrast rubki berezovyh nasaždenii. **[Exploitable age of Birch stands.]** *Lesn. Hoz.* 3 (8), 1950 (41). [Russ.]

With the increasing use in Russia of fuels such as coal, gas and peat, the demand for Birch fuelwood is declining and that for its timber, especially veneer logs, is becoming important. In view of this, it is necessary to re-examine the question of rotation. The author quotes data from 9 sample plots in Yaroslav Province, indicating the outturn of plywood logs conforming to the standard grading rules, and of other timber assortments and fuelwood. The stands in question were between 49 and 79 years old and of the 1st quality class. It was found that between these ages the respective %s of total merchantable timber and fuelwood varied scarcely at all. The outturn of acceptable veneer logs, however, expressed in % of total merchantable timber, rose with age, e.g. from 71% at 50–60 years to 83% at 70–80 years. It is concluded that a suitable rotation for the maximum yield of veneer logs would be 60–70 years in the southern and central parts of Russia, and 80–90 years in the north. Birch stands over 100 years old are subject to decay.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also No. 3248.

3250. WADSWORTH, F. H. **Forest management in the Luquillo Mountains. I. The setting.** *Carib. For.* 12 (3), 1951 (93–132). 57 refs. [E.Span.]

Preliminary results are given of a study to determine the annual amount of timber to be extracted in the Luquillo Division of the Caribbean National Forest, Puerto Rico. Data are presented on the ecology, topography, climate, soil, and water supply of the region, with a fairly detailed account of the vegetation, including the species representation and tree size in representative plots of virgin tabonuco, colorado, palm and dwarf forest types. Notes on reproduction and growth, based on 5-year records from 4 one-acre plots are also included. This first part of the study ends with notes on past exploitation of the forests, history of their conservation, animal life, mineral resources, and the nature and requirements of the human population.

3251. BØRSET, O. Hogstklassefordeling og hogstkvantum. [**The distribution of 'felling classes' and [the calculation of] the amount to be felled.**] *Tidsskr. Skogbr.* 59 (10), 1951 (357–9). [Nor.]

Discusses a previous article [cf. *For. Abstr.* 13 (No. 2358)] and suggests formulae to ensure greater accuracy in calculating yield.

3252. HUBER, A. **Examination of sustained yield management by the volume and increment control method.** *Pulp Paper Mag. Can.* 55 (1), 1952 (104 . . . 113). 5 tbls. Transl. by L. Holt from *Allg. Forstzeitschr.* 5 (26/27), 1950 (300–2), with revised figures for table 4.

An account of Swiss experience and management based on periodic measurement of stocking and increment.

3253. DUERR, W. A., and BOND, W. E. **Optimum stocking of a selection forest.** *J. For.* 50 (1), 1952 (12–6).

A method is presented for calculating the optimum stocking of selection forest. Optimum stocking, defined as that which will permit the greatest net return to the business, is determined at the point where marginal value growth % equals the alternative rate of return. This point is readily derived from a curve of current growth in value over the quantity and value of the growing stock. *From author's summary.*

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 2987, 2997, 3050, 3248, 3260, 3264, 3531.

3254. GUTTENBERG, S., and PUTNAM, J. A. **Financial maturity of bottomland Red Oaks and Sweetgum.** *Occ. Pap. Sth. For. Exp. Sta.* No. 117, 1951. pp. 24.

The six main factors to be determined are: the alternative rate of return securable for money invested in the tree; the relationship of tree volume and quality to diameter; the prediction of the tree's value from volume, grade and diameter; the tree's vigour as an index to its future growth rate; hence, the future rate of increase in tree value; and the influence of neighbouring trees on the decision as to its financial maturity. Bark and crown characteristics for *Quercus nuttallii, Q. phellos, Q. nigra, Q. falcata* var. *pagodaefolia* and *Liquidambar styraciflua* of high, medium and low vigour, are described, and corresponding bark characteristics illustrated by photographs. Tabulated figures show the rate of increase in value for the species, if left for a period of 10 years (the usual felling cycle in the bottomland hardwood districts), by log height, grade, diameter and vigour class. Simplified marking guides are given showing, for each vigour class and three common alternative rates of return, the maximum tree diameters that should be left to grow for another 10-year period.

3255. FRYJORDET, T. Forhåndsvurdering av investering i skogreising. [**Advance estimation of amounts to be invested in afforestation.**] *Tidsskr. Skogbr.* 59 (6), 1951 (169–75). 5 refs. [Nor.]

Of the three methods, based on discounted capital value, rental value, and the value from the rate of compound interest respectively, that based on discounted capital value is considered most applicable to afforestation. Formulae presented include those for calculating discounted capital value in the year of the first felling, the maximum site investment, the maximum and optimum investment in cultivation, and the effect of growth check in Spruce. Examples are given for their use in individual cases.

3256. HUBICKI, F. VON. Die Einheitsbewertung des forstwirtschaftlichen Vermögens: eine Anleitung. [**Unit valuation of property in forestry [for taxation purposes]: a practical guide.**] Verlag Georg Fromme & Co., Vienna. 1949. pp. [5] + 47. 3 refs. [G.]

66. COSTING OF LOGGING OPERATIONS

See also Nos. 3036, 3248.

3257. JUTA, E. H. P. Kostenadministratie bij het gebruik van vrachtauto's voor houttransport. [**Costing and mechanical transport of timber.**] *Tectona* 41 (2), 1951 (140–52). 12 refs. [Du.du.jav.]

[Cf. *For. Abstr.* 12 (No. 435).] With 5 specimen forms.

3258. JONSON, I. Kostnadstabell för basvägarbeten. [**Table of costs for building main haulage roads.**] *Norrlands SkogsvFörb. Tidskr.* 1949 (3), (227–33). [Sw.]

Gives a table showing approximate costs in Kr./m. for different types of soil and site, with an example of its use. The table has given a good indication of average costs in Särna forest district during the two years of its use.

3259. CLARK, S. F. **Logging costs in east Texas as affected by cut per acre and log size.** *Sth. Lumberm.* 184 (2301), 1952 (76, 78).

A study was made of costs of logging carried out on 540 acres in winter 1949–50. Results (tabulated) show that a small increase in the volume of the average log reduces logging costs far more than a small increase in volume felled per acre.

3260. ARBOGAST, C., JR. **Quality of logs and lumber obtained from an improvement cut in second-growth hardwoods in northern Wisconsin.** *Sta. Pap. Lake St. For. Exp. Sta.* No. 26, 1951. pp. 15. 2 refs.

A mill study was made of logs from improvement fellings in three 20-acre blocks of second-growth hardwoods in the Argonne Experimental forest. Of the 1120 hardwood logs, 88·5% were merchantable, 7·2% were below the minimum top diameter, and 4·3% were cull logs (less than ½ sound). The species represented were *Fraxinus americana*, *Tilia americana*, *Betula papyrifera*, *B. lutea*, *Prunus serotina*, *Ulmus americana*, *Ostrya virginiana*, *Acer rubrum*, and *A. saccharum*. Figures showing amount and value of lumber produced from logs of different species and classes, lumber grade recovery by log classes, overrun, distribution of volume within the Madison log grades, estimates from Madison recovery tables against actual yield, and costs and returns by species for the total amount felled, are tabulated. Results show that: (1) improvement felling can yield timber justifying commercial operations; (2) Sugar Maple and Yellow Birch cull logs of comparable size and form, yield lumber of the higher grades about equal in value to that obtained from merchantable logs; (3) hardwood logs below minimum top diameter yield very poor timber and cannot be cut profitably for factory lumber; and (4) log grade rules and recovery tables developed at Madison for old-growth hardwoods apply satisfactorily to second-growth hardwoods in the area.

3261. OSBORN, R. M. **Costs of producing mine props.** *Occ. Pap. Sth. For. Exp. Sta.* No. 124, 1951. pp. 22.

A study was made in the mixed Pine/hardwood types in Alabama. Most of the stands were poorly stocked, averaging 100 sound stems and about 515 cu. ft./acre. About ⅓ the volume was in trees 5–9 in. in d.b.h. and only 10% in trees 15 in. and over. Results include the following: (1) The direct costs of producing hardwood props from the general run of tree sizes averaged 20% higher than those for Pine. (2) A 3-man crew using a power chain-saw was cheaper than 2-man crews with bow saw or crosscut, for felling trees 8-in. d.b.h. and over, as long as the chain-saw was operating steadily. (3) The 3-man chain-saw crew was also cheaper for crosscutting logs and bolts over 7 in. in diameter. (4) Splitting the lower bolts of larger trees (8 in. d.b.h. when 3- and 4-ft. props were being produced, and 10 in. d.b.h. for 5- and 6-ft. props) reduced costs of props. (5) Topping time increased rapidly for diameters above 6·5 in. u.b. at the point of cutting. (6) Costs of trimming Virginia Pine were higher than those for Loblolly or for hardwoods.

67. ASSESSMENT OF FINANCIAL RESULTS; BOOK-KEEPING AND ACCOUNTANCY; BUSINESS STATISTICS; SHORT-TERM PLANNING AND FINANCING

See also No. 3531.

3262. OWEN, L. O. **Dovey Woodlands (Coedlannau bro Ddyfi) Limited.** *J. Oxf. Univ. For. Soc.* (*Ser. 3*) No. 6, 1952 (3–7).

Account of the finances of a forestry co-operative set up in 1948.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

685. *Planning and Organization of Telecommunications*

3263. SAMUELSON, D. **Adapting two-way radios to logging operations.** *Sth. Lumberm.* 183 (2297), 1951 (214–6).

686. *Planning and Organization of Buildings, Transport Installations (Roads etc, including Power-line Rights-of-Way)*

See also Nos. 2987, 3042.

3264. BERG, E. Kraftledningsgater gjennom skog. **[Lanes for power lines through forests.]** *Tidsskr. Skogbr.* 59 (7/8), 1951 (233–41). [Nor.]

Estimates the amount of forest land used to create safety lanes for power lines and the annual loss of timber involved, and discusses methods of compensating landowners. The loss in value of timber for export is calculated to be sufficient to justify laying ground cables on the better-quality site classes for 20,000-volt lines, which generally have a lane 10 m. wide. The use of power lanes for growing forage, Christmas trees, or small trees for pulpwood, is discussed.

3265. WÅHLÉN, N. Norrlands Skogsvårdsförbunds exkursion till Hälsingland den 20–21 Juni 1949. **[An excursion by the Norrlands Skogsvårdsförbund to Hälsingland June 20–21, 1949.]** *Norrlands SkogsvFörb. Tidskr.* 1949 (4), (397–522). [Sw.]

Includes discussion on power lanes, with figures for forest areas lost throughout Sweden, and the breadth of lane needed for safety on different site classes.

687. *Planning and Organization of the Transport of Men, Supplies and Equipment*

See No. 3053.

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

See also No. 3371.

3266. **Report of a fact-finding committee on the timber industry in the Western Province of the Gold Coast.** Government Printing Department, Accra. 1951. pp. xii + 71. Price 2*s*.

Deals with the following subjects: the forest and the timber industry (including ownership, royalties, timber concessions and felling agreements); the log industry (including property marks and log protection); the processing industries (including siting and distribution of sawmills, markets, and prices); transport and shipping; customs and currency control; grading and seasoning; market research; and trade associations. A 12-page summary and recommendations are prefixed to the report.

3267. BUTTERWORTH, E. G. **Gold Coast timber industry.** *Timb. Tr. J.* 200 (3935), 1952 (993–5).

Gives figures for Gold Coast exports of logs and sawn timber by species for 1950, and lists uses of some secondary timbers in good supply.

71. MARKETING OF FOREST PRODUCTS: GENERAL

See also Nos. 2987–8.

3268. LATHAM, B. **A historical survey of the timber trade. 1. The small roots. 2. The Great Fire and after. 3. Rise of the colonial market. 4. Victorian expansion. 5. The twentieth century. 6. The trade today.** *Wood* 16 (1–6), 1951 (21–3; 61–3; 101–3; 141–3; 190–3; 226–8).

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

3269. **Timber statistics, including market reports for January-March 1950 and 1951.** *Quart. Bull. Timb. Statist. FAO* 4 (1), 1951. pp. 152. [E.F.]

Cf. *For. Abstr.* 10 (No. 2194).

3270. MACGREGOR, J. J. **European timber economy and international organisations—1. Supply and demand. 2. Long and short term supply measures. 3. The Technical Assistance Programme.** *Wood* 16 (9–11), 1951 (350–2; 394–5; 429–30).

3271. Ulkomaankauppa. Vuosijulkaisu 70, 1950. **[Foreign commerce. Annual report 70, 1950.]** Suomen Virallinen Tilasto, Helsinki. 1951 [4]+218. [Fi.Sw.f.]

3272. Skogindustriene i året som gikk. **[The Norwegian forest industries during 1951.]** *Norsk Skogind.* 6 (1), 1952 (4–10). [Nor.E.] P.R.

Gives figures for production, value, and exports of the paper and board, the chemical pulp, the mechanical pulp and the timber industries.

3273. MAY, R. H. **Production of logs and bolts for plywood, pulp, container veneer, shingles, cooperage, poles and piling in California, 1950.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 79, 1951. pp. 6.

74. TRADE POLICY

See also No. 3270.

3274. HOLOPAINEN, V. Eräitä näkökohtia suhdannepidätyksistä ja vientimaksuista. **[Export duties on Finnish forest products.]** *Metsät. Aikak.* 1951 (11), (283–6). [Fi.e.]

Discusses the economic effect of recent and proposed legislation regarding export duties for timber and wood products, on the woodworking industries, forest owners and wage earners.

75. TRADE CUSTOMS AND USAGES

3275. RICHARDS, E. G. **The marketing of small sized conifers.** *J. Land Agents' Soc.* 51 (2), 1952 (61–3).

Deals primarily with the marketing of thinnings, and particularly with the sale of standing thinnings. [Cf. *For. Abstr.* 13 (Nos. 2987–8).]

79. ECONOMICS OF THE WOOD INDUSTRIES

3276. OITTINEN, O. Ensiasteisen puunjalostusteollisuuden laajentaminen Teollisuuskomitean miettinnössä. **[The expansion of primary forest industries as proposed in the report of the Industrialization Committee.]** *Metsät. Aikak.* 1951 (11), (279–82). [Fi.e.]

The report deals with the woodworking industries under 3 sections: (1) the problem of maintaining their competitive and productive capacity; (2) the possibility of expanding primary woodworking industries and (3) improvement in finishing. Under (2), suggested methods of increasing production include the exploitation of forests at present inaccessible, reductions in wood-waste and reduction in the export of round timber. Tentative figures are given for possible increases in output in pulp, wallboards, sawn goods and plywood. *From author's summary.*

8. FOREST PRODUCTS AND THEIR UTILIZATION

See also No. 2713.

3277. BELLMANN, H., and FICKLER, H. H. [Editors]. Taschenbuch für den Holzfachmann. 1951. **[A pocket-book for the timber specialist. 1951.]** Krögers Verlagsanstalt G.m.b.H., Hamburg-Blankenese. [*n.d.*] pp. 352 + 20 photos. [G.] P.R.

Includes sections on: wood as material, woodworking machines, woodworking, and wood preservation.

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

See also No. 3455.

810. *General Information on Woods*

See also Nos. 2887–8, 3267.

3278. DESCH, H. E. **Manual of commercial timbers. Volume 1.** The Author, Woodman's

Folly, Crockham Hill, nr. Edenbridge, Kent. 1951. Price £1. 1*s*. 0*d*.

Notes on the nomenclature, structure, properties, uses and supply of 60 species, with an anatomical drawing of each. The work is issued in loose-leaf form, and supplementary sheets covering 10 or 20 timbers will be issued periodically. Descriptions will be revised as additional information is obtained. Specimens of the timbers described are available to supplement the text.

3279. PEREIRA, J. ARANHA, and MAINIERI, C. Madeiras do Brasil. Sua caracterização, usos comuns e índices qualificativos físicos e mecânicos. **[Brazilian timbers: description, common uses, and physical and mechanical properties.]** *An. bras. Econ. flor., Inst. nac. Pinho* 2 (2), 1949 (283–351). [Port.]

Classified data on 30 Brazilian timbers. [Cf. *For. Abstr.* 13 (No. 3373).]

3280. Madeiras brasileiras de exportação. **[Export timbers of Brazil.]** *An. bras. Econ. flor., Inst. nac. Pinho* 2 (2), 1949 (43–50). [Port.e.]

Vernacular names, with synonyms, listed alphabetically, and scientific names and exporting states.

3281. BUBLITZ, W. Die wichtigsten Holzarten der Mangrovewälder Kolumbiens. **[The most important timbers of Colombia's mangrove forests.]** *Z. Weltforstw.* 14 (5), 1951 (157–8). [G.]

Describes the tree and the wood and gives vernacular names, properties and uses of *Rhizophora mangle*, *R. racemosa*, *Avicennia nitida* and *Conocarpus erectus*.

3282. BUBLITZ, W. Die wichtigsten Holzarten des Monsunwaldes Kolumbiens. **[The most important species of Colombia's monsoon forests.]** *Z. Weltforstwirt.* 15 (1), 1952 (34–5). [G.]

Describes the timber and its properties and uses, with brief notes on the tree and its distribution, for 10 common species.

3283. LAMB, G. **Foreign woods.** *Wood, Chicago* 57 (2), 1952 (78–9). P.R.

Cojoba (*Cojoba arborea*); Black Kateralli (*Eschweilera sagotiana*); Frijojillo (*Pseudosamanea guachapele*); and Vaco (*Magnolia sororum*).

3284. **Specimen woods Nos. 193–5.** *Suppls.* to *Wood* 17 (1–3), 1952 (19–20; 58–9; 99–100).

Ayan (*Distemonanthus benthamianus*); British Honduras Pitch Pine (*Pinus caribaea*); and Merbau (*Intsia bakeri*).

3285. SCHMIDT, E. Überseehölzer Nr. 29–30. **[Foreign woods Nos. 29–30.]** *Suppls.* to *Z. Weltforstw.* 14 (6), 1951. pp. [4]; 15 (1), 1952. pp. 4. 1 ref. [G.]

Iroko (*Chlorophora excelsa*) and Limba (*Terminalia superba*).

3286. MOLTESEN, P. Lærkeveddets egenskaber og anvendelser. **[The properties and uses of Larch wood.]** *Tidsskr. Skogbr.* 59 (11/12), 1951 (374–89). 39 refs. [Dan.]

Contains information, drawn from literature, on dimensions, defects, bark %, heartwood and sapwood, density, strength properties, fibres, resin content, chemistry, calorific value, durability, and working qualities of Larch, and some of its uses.

3287. KRZYSIK, F. Racjonalne wykorzystanie drewna bukowego. **[Rational utilization of Beech timber.]** *Sylwan* 95 (2), 1951 (171–94). 30 refs. [Pol.f.]

An account of its logging, durability, preservation and steaming, uses, and the need for further research on its chemical utilization. The estimate of 1948 put the Beech and Hornbeam reserves of Poland at 185,072 ha. and their annual production at ca. 674,000 cu.m. (round measure) over 7 cm. in diam., or, say, 270,000 cu.m. of sawn timber.

3288. **Spotted Gum. [*Eucalyptus maculata*.]** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 5 (2), 1951 (10–5).

Contains brief notes on distribution and the botanical description of the tree, and describes the wood, its uses, durability, seasoning and mechanical and physical properties.

3289. WYK, W. C. E. VAN. ***Canthium mundtianum.*** *Trees S. Afr.* 3 (3), 1951 (19, 23).

A note on the tree and its wood, which develops pleasing bluish-grey stripes in seasoning, probably due to some form of mildew.

811. *Structure. Identification*

See also Nos. 2810, 3461.

3290. JOHNSTON, D. R. **Structure drawings to 'Specimen Woods'. Sheets 7–9.** *Wood* 17 (1–3), 1952 (21–3; 61; 98).

(7) Canadian Yellow Birch (*Betula lutea*), Sweet Chestnut (*Castanea sativa*), Jarrah (*Eucalyptus marginata*), and Indian Silver Greywood (*Terminalia bialata*).

(8) European Ash (*Fraxinus excelsior*), Macassar Ebony (*Diospyros* spp.), White Peroba (*Paratecoma peroba*), and Zebrawood (*Astronium fraxinifolium*).

(9) European Oak (*Quercus* spp.), European Walnut (*Juglans regia*), Cedar (*Cedrus libani*) and Yew (*Taxus baccata*).

3291. JANSSONIUS, H. H. **Key to the Javanese woods on the basis of anatomical features.** E. J. Brill, Leiden. 1952. pp. xi + 244. [E.] X.

Translation of a key previously published in German. [Cf. *For. Abstr.* 8 (No. 287).]

3292. WAGEMANN WIEDEBRUG, G. Maderas chilenas—contribución a su anatomía e identificación. **[Chilean woods—their anatomy and identification.]** *Lilloa* 16, 1948 (263–75 + 29 plates). 16 refs. [Span.g.] A.P.B.

Some general notes on wood anatomy, followed by detailed studies of a large number of Chilean species and a key to the species.

3293. OCCHIONI, P., and SOUZA, A. H. DE. 'Pau rosa' brasileiro e seu óleo essencial. **[*Aniba rosaeodora* Ducke and its essential oil.]** *Lilloa* 16, 1948 (213–42 + 9 plates). 41 refs. [Port.e.] A.P.B.

An anatomical and histological study of the tree and of the chemical composition of the oil and its uses.

3294. Botelho, E. A. Fichas anatômicas de espécies vegetais brasileiras. [**Anatomical characteristics of some Brazilian species.**] *Boletim do INT, Rio de Janeiro* 2 (2), 1951 (65–71). [Port.]

Ocotea guyanensis, *O. costulata* and *O. canaliculata*.

3295. Cozzo, D. Anatomía del leño secundario de las leguminosas Mimosoideas y Cesalpinioideas argentinas silvestres y cultivadas. [**Anatomy of the secondary wood of wild and cultivated Argentine species of Mimosoideae and Caesalpinioideae.**] *Revista del Instituto Nacional de Investigación de las Ciencias Naturales, Ciencias Botánicas* 2 (2), 1951 (63–146 + 12 plates). 17 refs. [Span.e.g.f.] X.

Cf. *For. Abstr.* 12 (No. 2982; 13 (No. 3301).

3296. Gorczyński, T. Badania anatomiczno-porównawcze nad drewnem buka zwyczajnego (*Fagus silvatica* L.). [**Comparative anatomical studies on Beech wood.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 7, 1951 (3–114). 49 refs. [Pol.pol.e.]

Presents the results of studies conducted in 1937–8 on the normal wood of Beech trees from four localities in Poland. Five test pieces were cut out along a radius (from pith to bark) from disks taken at a height of 3 m. from each of 15 trees. The disks were kept 3–4 weeks in 75% C_2H_5OH before examination. The test pieces included: wood without frost heart; wood with distinct frost-heart and false-heart zones; wood with zones of coloured spots and false heart, and wood with indistinct frost-heart and false-heart zones. Coloured zones can be due to: frost heart without mycelia, wood containing mycelia, and abnormal parenchymatous wood. It is on these three conditions that the structure and durability of the coloured wood depends. Within the tree, and as between trees, the vessels were found to be the least variable anatomical feature (in regard to their number and cross-section) and fibres (in the same respects) the most variable. Most cross-sections of sound wood free of frost heart showed a dark red core of false heartwood, containing coloured substances in the parenchyma and sometimes in the other elements. These coloured substances (consisting of pectin-like materials, pentosans, hemicelluloses, tannins, fatty substances, and the like) induce changes in the cell wall, which becomes harder, more brittle, and less permeable. No fungi were found in these samples. Samples with coloured zones contained tyloses distributed across the whole stem; some relation exists between the colour-generating processes and the formation of tyloses. Where the latter are abundant, coloured substances fill the lumina of all wood components. Beech wood can contain zones composed exclusively of parenchyma cells. Three cases of anomalous parenchyma were observed: (*a*) the formation of a parenchyma zone, either on one side only or on both sides of the annual ring; (*b*) excessive growth of rays tangentially to form parenchyma zones interrupting the continuity of the inter-ray elements; (*c*) callus parenchyma formed in places that have been damaged (mechanically or otherwise). The wood with coloured zones may or may not contain fungi. These can be easily detected in wood near the pith and in abnormal parenchymatous wood, by the dark-brown colour of the bead-like chlamydospores. No Ca oxalate is found in normal Beech wood but crystals of it were seen in the vessels of the irregular tissue formed in a radial split. The 40 photomicrographs have English captions. [Cf. *For. Abstr.* 13 (Nos. 3411–2).]

811.1. Anatomical Elements and Tissues

See also Nos. 2852, 3107.

3297. Harada, H., Kishima, T., and Kadita, S. **The micellar orientation in the secondary wall of coniferous tracheids. 2.** *Wood Res., Kyoto* No. 6, 1951 (34–42). 9 refs. [Jap.e.] X.

Cf. *For. Abstr.* 13 (No. 2409).

3298. Harada, H., and Kishima, T. **The fibrillar orientation in the secondary walls of cells of hardwoods.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (215–7). 3 refs. [Jap.e.]

Preliminary results for normal and tension wood of *Castanea crenata*, *Quercus serrata* and *Alnus japonica* are given, using Bailey's method.

3299. Bosshard, H. H. Variabilität der Elemente des Eschenholzes in Funktion von der Kambiumtätigkeit. [**Variation in the elements of Ash wood as a function of cambial activity.**] *Schweiz. Z. Forstw.* 102 (12), 1951 (648–65 + 6 photos). 44 refs. [G.f.]

Measurement of fibre length in stems of *Fraxinus excelsior* showed that on a given radius the length of fibres in the first 30 rings increases from the pith outwards and thereafter decreases. In any annual ring, the summerwood fibres are up to 79% longer than the springwood fibres. On a given radius, the length of the summerwood vessels scarcely varies with age, but the springwood vessels show a typical growth similar to that of the fibres. The vessels formed in spring are shorter than those formed in summer or autumn. The cells of the cambial area increase in length with age, and this lengthening of the initial cells is the cause of the increase in fibre length with age. By the use of the electron-microscope it was observed that the woody fibres grow at both ends, but it is believed that they also increase in area in their middle part.

3300. Akins, V., and Pillow, M. Y. **Occurrence of gelatinous fibers and their effect upon properties of hardwood species.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (254–64). 11 refs. P.R.

A summary of recent research results.

811.2. Special Features and Abnormal Structure

See also No. 3296.

3301. Cozzo, D. Estructura leñosa estratificada no registrada en géneros de Leguminosas argentinas. [**Storeyed structure, hitherto unrecorded, in wood of [fourteen] Argentine genera of the Leguminosae.**] *Lilloa* 16, 1948 (63–95 + 5 plates). 25 refs. [Span.e.] A.P.B.

Cf. *For. Abstr.* 13 (No. 3295).

811.4. Growth Rings. Early and Late Wood

See Nos. 2852, 3227, 3299.

811.5. Sapwood and Heartwood

3302. YAZAWA, K. **The relation between the percentage of heartwood and the growth of Japanese Red Pine (*P. densiflora* S. et Z.).** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (234–6). 2 refs. [Jap.e.]

Results of measurements of annual-ring breadth and breadth of heartwood and sapwood are tabulated; and also the relationships between heartwood diameter and log diameter, and between breadth of annual ring and heartwood %.

3303. HIRAI, S. **A study of the process of heartwood growth in the stem of Japanese Larch.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (231–4). 4 refs. [Jap.e.]

Examination of increment borings gave the following results: (1) Generally, heartwood increased at the rate of 1 ring per year, but examples occurred of a 2-ring increase in 1 year and of no increase in 2 years. (3) The season of the change is closely connected with cambial activity, and occurs between July and November. *From author's summary.*

811.7. Phloem. Bark

See No. 2792.

812. *Physical and Mechanical Properties*

See also Nos. 3226, 3300, 3461, 3537.

3304. GARCÍA, R. R., and GARCÍA, J. J. M. Glosario de términos relacionados con las propriedades físicas y mecánicas de las maderas. **[Glossary of terms related to the physical and mechanical properties of wood.]** *Lilloa* 18, 1949 (111–32). 19 refs. [Span.g.] A.P.B.

3305. GIORDANO, G. Studio comparativo sul legno del larice, dell'abete rosso e del pino silvestre proveniente dalle foreste alpine e dai rimboschimenti dell'Appennino. **[Comparative study of the wood of Larch, Norway Spruce and Scots Pine from alpine forests and from plantations in the Apennines.]** *Ital. for. mont.* 6 (6), 1951 (288–97). [It.it.f.e.]

The species concerned are not indigenous in the Apennines. Tests on some hundreds of specimens showed that plantation-grown Spruce from the Apennines is generally lighter than that from natural alpine forests, but for the same density has equal strength, whereas Larch and Scots Pine of similar provenance was not only lighter than alpine material but had lower strength for the same density. The data are presented in graphs and tables.

3306. LÁNYI, J. A vöröstölgy müszaki tulajdonságainak vizsgálata. **[Research on the technical properties of Red Oak.]** *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (203–36 + 2 photos). [Hu.g.russ.]

Results of investigations on *Quercus borealis* from experimental stands in Hungary, shown in graphs and tables, include the following: (1) Its morphological characteristics compare favourably with those of other Oaks grown in Hungary. (2) Its anatomy is similar. (3) Results of shrinkage tests are satisfactory. (4) Specific gravity equalled that of native Oaks and the available data on foreign species. (5) Hardness of timber from one stand was a little below, and from another equalled the value given in literature. (6) Strength properties were reasonably constant for all the material examined; the values for *Q. borealis* often equal or surpass those from literature for foreign Oaks. (7) Compressive strength of wood from the two sites was greatest in specimens with 75% late wood in annual rings 4·5 and 4·3 mm. wide respectively. Bending strength was greatest in rings 4·5–5·5 and 4·0 mm. wide. Shear strength and breaking strength are not related to annual-ring width. [Cf. *For. Abstr.* 13 (No. 2887).] *From author's summary.*

3307. HIRAI, S., and KITAHARA, K. **Study of the timber of *Acacia mollissima* Willd. from 'Chiba' University Forest.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (97–103). 9 refs. [Jap.e.]

Average values of physical and mechanical properties from a 5-year-old sowing are tabulated. Values for compressive strength, shear strength and bending modulus of rupture of trees damaged by a typhoon in 1948 are below those for sound trees. *From authors' summary.*

3308. GARCÍA, R. R. Estudio físico-mecánico del Guayacan—*Caesalpinia melanocarpa* Griseb. **[Physical and mechanical properties of *C. melanocarpa*.]** *Lilloa* 18, 1949 (143–53). [Span.g.] A.P.B.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 3417, 3443, 3475.

3309. NAMBIYAR, V. P. N. **Action of wood on a photographic plate.** *Curr. Sci.* 18 (8), 1949 (284–6). 1 ref. A.P.B.

A wide variety of Indian species were placed in the dark in contact with photographic plates, in order to test their photographic activity. A prolonged exposure, varying from 48 to 72 hr. (as compared with 30 min.–18 hr. for European species) was required to obtain a clear picture. Exposure to light before contact with the plates increased the photographic activity of the wood. The action of different parts of the spectrum was also investigated by means of filters. Wood covered by a red filter was least active, and that covered by a blue filter most active. After extraction of resinous bodies from the wood before exposure, the wood ceased to be photographically active.

3310. NAMBIYAR, V. P. N. **Russel effect in Indian timber woods.** *Curr. Sci.* 20 (11), 1951 (290–1). 4 refs. A.P.B.

The results of further investigations into the photographic activity of timbers. Ten South Indian species were placed for 48 hr. in contact with photographic plates after being irradiated by sunlight for 10 min. The density of the images was measured with a photo-electric cell, and the results are recorded. The effect was most pronounced in *Poeciloneuron indicum* and weakest in *Dalbergia paniculata.*

3311. NARAYANAMURTI, D., and JAIN, N. C. **The damping capacity of some Indian timbers: II Logarithmic decrement in flexure.** *Journal of the*

Aeronautical Society of India, New Delhi 3 (3), 1951 (79–87). 6 refs. L.A.S.

Air-dry specimens of 24 Indian coniferous and broadleaved species were tested, where possible, both along and across the grain. [Cf. *For. Abstr.* 12 (No. 2020).]

3312. SVOBODA, P. Ozvučné dřevo smrku. [**The resonance wood of Spruce.**] *Lesn. Práce* 29 (5/6), 1950 (188–214). 62 refs. [Cz.russ.e.]

Details are given of ecological and other data gathered during the last century about the stands where resonance wood is found. Special attention is drawn to a variety of Spruce, *Picea abies* var. *fissilis*, highly valued for its resonance qualities. [Cf. *For. Abstr.* 13 (No. 2526).]

3313. WRIGHT, R. H., and HAYWARD, A. M. **Kinetics of the thermal decomposition of wood.** *Canad. J. Technol.* 29 (12), 1951 (503–10). P.R.

The rate of decomposition of dry Western Red Cedar and Western Hemlock when introduced suddenly into an atmosphere of N at 500, 700, and 900° C. has been studied. For cubical pieces the reaction is approximately of the one-half order; for disks it is of zero order. For cubes the rate constant is directly proportional to the specific surface and to the temperature, and the proportionality constants are the same for both species of wood. *Authors' summary.*

3314. FONS, W. L. **Heating and ignition of small wood cylinders.** *Industr. Engng. Chem.* 42 (10), 1950 (2–30). 12 refs. P.R.

Cylinders of Ponderosa Pine from $\frac{3}{32}$ to $\frac{3}{8}$ in. in diameter and of known moisture content (m.c.) were tested in a furnace above the ignition temperature of the wood. The temperatures at different radii of each specimen were recorded at intervals, and the time until the first appearance of flame was measured. M.c. lengthened ignition time more than can be explained by the rise in specific heat due to moisture. Up to 1300° F. ignition time increased as size of the specimens increased; above 1300° the size had no effect on ignition time. It was found that flames may appear in a mass of material if some parts of it are heated to not less than 800°. If some material is reduced to charcoal, it will be rekindled by a temperature of 450°. It was found that the surface ignition temperature of wood under conditions of rapid heating was nearer to 650° than to 550° as usually quoted.

3315. MITCHELL, N. D. **New light on self-ignition.** *Quart. nat. Fire Prot. Ass., Boston* 45 (2), 1951 (165–72). 4 refs. D.S.I.R.

Tests with wood-fibre insulating boards, felted purified cotton linters, coal, and hay, showed that spontaneous heating in appreciable amounts was observable at relatively low ambient temperature. The larger the volume involved, the lower the temperature required to initiate perceptible self-heating. Likewise, the temperatures required to cause self-ignition of the larger volumes of material were decidedly lower than those required for the self-ignition of the smaller ones. Whereas ambient temperature of 603° F. was required to cause the ignition of a $\frac{1}{2}$-in. cube of wood fibreboard, a specimen 22 in. thick required only 228° to ignite it through spontaneous heating. The self-heating of a 12-in. specimen at 147° was appreciable. In fact, the self-heating was accelerated to ignition when the ambient temperature was raised to prevent undue loss of heat from the reaction so started. *Author's summary.* [Cf. *For. Abstr.* 10 (No. 1259).]

3316. NIWA, T. **Study of the electrical resistance of Todo-fir [*Abies mayriana*].** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (228–31). 7 refs. [Jap.e.]

The results of measurements, made radially, longitudinally and tangentially, of electrical resistance, for different moisture contents, are tabulated.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 3344, 3440–3.

3317. REICHERT, T. Neues Verfahren zur Holzuntersuchung und Überwachung von Holztrocknungsanlagen. [**A new method for timber testing and control of timber seasoning plants.**] *Holztechnik* 32 (1), 1952 (6–9). [G.] P.R.

An illustrated description of two methods for which patents of the Federal German Republic have been applied. The first deals with the determination of the moisture content of wood by means of a 'hygrodasymeter', and is based on the fact that the moisture content of each species at full saturation depends only upon the 'oven-dry/green' specific gravity of the wood, i.e. on the weight of an oven-dry specimen divided by its volume when green. Cross-cut disks 2 cm. thick are weighed immediately after being sawn off, brought to full saturation in the hygrodasymeter, and weighed again, their final volumes being also determined by weighing. The moisture content and the 'oven-dry/green' sp. gr. are then calculated by means of a formula, using two tables supplied with the apparatus. The second patent refers to a controlled removal of moisture from wood during seasoning, the governing principle being to express the drying rate not in moisture-content % per unit of oven-dry weight per hour, but in kg. water per green volume unit per hour. The average moisture content and the 'oven-dry/green' sp. gr. of the batch are determined as before; test-pieces of average samples are then suspended from a balance beam in the drying duct, and their loss of weight is either directly read off by means of a nomograph in kg./cu.m. green volume, or else recorded.

3318. PERKITNY, T. Badania nad ciśnieniem pęcznienia drewna. [**Investigations on the swelling pressure of wood.**] *Prace Inst. Bad. Leśn.* No. 64, 1951. pp. 116. 45 refs. [Pol.]

Presents the results of an investigation on the swelling pressure of timber with various degrees of initial moisture content, the effect of pressure on the swelling of timber, and the compressibility of timber swollen under pressure. The swelling pressure measured was that which had to be applied to the test piece during wetting in order to maintain at the pre-wetting level one dimension of the test piece, parallel to the pressure measured. The swelling-pressure/wetting-time curve rises first steeply then

more gently and, after having reached a maximum value, usually falls. It begins to fall while both moisture content and degree of free swelling are still increasing vigorously. The swelling pressure corresponding to a free swelling of 1% varies from 0·9 kg./sq. cm. for Poplar to 3·7 kg./sq. cm. for Ash. The mechanical pressure that must be applied to a swollen test piece to restore the absolute-dry-state dimensions is, for all species tested, several times greater than the swelling pressure proper. While it is true that tangential swelling is greater than radial, the swelling pressure is usually greater in radial than in tangential direction. Swelling pressure exerted by plywood parallel to the layers is only ca. 7% of that exerted by a similar thickness of solid wood, while swelling pressure perpendicular to the plies is nearly the same as that for solid wood. The swelling pressure exerted by wet timber is the less, the higher its initial moisture content. Wet timber subjected to swelling under pressure is less compressible than wet timber swollen without pressure. Wet timber swollen under pressure is up to a certain boundary stress less, and above this stress more, compressible than absolutely dry timber.

3319. STAMM, A. J., and TARKOW, H. **Penetration of cellulose fibers.** *Repr.* from *J. phys. colloid Chem.* 1950 (745–53). 27 refs. P.R.

A discussion based on literature published during the last 25 years. Fibres of wood can be directly penetrated only by polar liquids which, except for a small correction, add their volume to that of the cell walls. The extent of penetration seems to be dependent upon the ability of the liquid to form H bonds with the OH groups of cellulose and lignin, and upon the size of the liquid molecules. Solutions usually penetrate the fibres much more slowly than the solvent, but they finally swell wood more than the solvent or solute alone. Non-polar liquids cannot penetrate fibres but they can replace polar liquids already in them, with the exception of the monomolecularly absorbed portion of the polar liquid.

3320. NARAYANAMURTI, D., RANGANATHAN, V., and RATRA, R. S. Bewegung von Flüssigkeiten durch Holz. **[Movement of liquids through wood.]** *Holz Roh- u. Werkstoff* 9 (11), 1951 (422–6). 10 refs. [G.g.] P.R.

Presents the results of an investigation of the movement in several Indian woods (in green state) of solutions of inorganic substances used in wood preservation and improvement. The permeability, which changed from one species to another, was several times greater along the grain than across it. Permeability increased with concentration. The velocity of flow decreased with time and reached equilibrium value in the course of 24 hours. It seems that pH value has some effect on the movement of liquids. It was found that H_3BO_3 and $Na_2B_4O_7$ have the same velocity of flow through wood. *From authors' summary.* [Cf. *For. Abstr.* 13 (No. 1507).]

3321. SJAVCILLO, S. V., and DANILINA, A. F. Zaraženie drevesiny tetraètilsvincom. **[Contamination of wood with lead tetraethyl.]** *Gigiena i Sanitarija, Moskva* 1951 (7), (49–50). [Russ.] L.S.

Presents the results of tests on the conditions of contamination of wood (floor of railway wagons) with $Pb(C_2H_5)_4$. Air-dry Pine or Spruce wood (moisture content 13·6–20%, 5–7 annual rings/cm.) was tested. When $Pb(C_2H_5)_4$ [which the authors mention as the main component of 'ethyl liquid'] is applied to the cross-cut end, it spreads into the wood almost instantly, colouring the fibres red. The maximum depth of penetration is 0·4–0·5 cm. When applied to wood sawn along the grain, penetration is 8–10 times deeper, and the rate of absorption also higher. Wood absorbs $Pb(C_2H_5)_4$ vapour quite readily. It is possible to remove the liquid from wood by consistent airing, unless it has penetrated some 3 cm. Steaming at 100° C. also proved effective, provided the amount of the liquid on the surface was less than 0·6 g./sq. cm.

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 3344–5, 3441, 3443.

3322. SUSMEL, L. Peso specifico del legno di *Eucalyptus rostrata* dell' Agro Pontino. **[Density of *E. rostrata* wood from the Agro Pontino.]** *Monti e Boschi* 3 (2), 1952 (75–8). [It.f.e.]

A study was made of 4 stems from windbreaks. Density varied from 700 to 800 kg./cu.m. Heartwood was heavier than sapwood. There were indications that wood from trees grown on less fertile soils was heavier than that from more fertile.

812.7. Strength Properties

See also Nos. 3318, 3378, 3381–2, 3384–7, 3425, 3468–9.

3323. KEYLWERTH, R. Die anisotrope Elastizität des Holzes und der Lagenhölzer. **[Anisotropic elasticity of wood and laminated wood.]** *VDI-Forschungsheft, Düsseldorf* No. 430, 1951. pp. 40. 47 refs. [G.] X.

Includes sections on: wood as a rhombic crystalline material; simple stress cases with anisotropic elasticity; determination of constants for wood; elasticity of laminated woods.

3324. RUNKEL, R. O. H., and WILKE, K.-D. Zur Kenntnis des thermoplastischen Verhaltens von Holz. Zweite Mitteilung. **[The thermoplastic behaviour of wood. 2nd part.]** *Holz Roh- u. Werkstoff* 9 (7), 1951 (260–70). 25 refs. [G.g.] P.R.

A detailed report of further investigations [cf. *For. Abstr.* 13 (No. 1543)], with some results presented in tabular form or graphs. It is claimed that experimental evidence seems to confirm the author's working hypothesis according to which the change of the wood polyoses (hemicelluloses) can be of importance for the heat treatment of wood. Chemical analysis indicates that the heating of wood, lignocellulose, and the like in a closed space causes changes to occur in two phases, the hydrolysis phase being predominant at the outset and the condensation phase later. Resinous substances are likely to be formed in the condensation phase as a result of poly-condensations. The species tested were *Fagus sylvatica* and *Picea abies*.

3325. PALLAY. N. A Sopron-kömyéki vörösfenyö szilárdsági vizsgálata. **[The strength of Larch grown near Sopron.]** *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (63–130). [Hu.g.russ.]

Results of tests on the strength, hardness, and shrinkage of Sopron Larch are given in graphs and tables and compared with data from literature and results of tests on Pine and Spruce grown in Hungary. Sopron Larch compares unfavourably with figures from literature for compressive and more especially for tensile strength. Bending strength, modulus of elasticity, and shear strength, are normal. The Larch is equal or superior in strength to Hungarian-grown Pine and Spruce. *From author's summary.*

3326. MACK, J. J., and COOPER, K. L. **Projects T.M.9–14 and 9–15. Progress report No. 1. Mechanical properties of plantation-grown Slash and Loblolly Pines.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, Melbourne. 1951. pp. 5 + 1 photo, 6 tbls. 13 refs. P.R.

Tabulated data of various mechanical properties of green and air-dry specimens of both species.

3327. OTA, M. **Studies on the properties of Bamboo stems. (Part 6), The distribution of load in compression parallel to the grain [for *Phyllostachys reticulata* and *P. edulis*].** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (238–40). [Jap.e.]

3328. NAKAMURA, T. **Nail-holding power of wood and its persistence.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (245–8). [Jap.e.]

Trials on 25 Japanese species are tabulated and briefly discussed. When decay has passed beyond its early stages, the nail-holding power of the wood is proportional to its specific gravity. The nail-holding power of wood exposed to weather is increased by corrosion, but this effect is not lasting. With a pre-bored nail hole, subsequent impregnation with creosote lowers nail-holding power. *From author's summary.*

3329. BOKOR, R., and LÁNYI, J. A hazai lombosfák szegtartóképességének vizsgálata. **[Research on the nail-holding properties of Hungarian hardwoods.]** *Ann. Fac. silvat. Univ. Agric. Sopron* 1 (1), 1950 (339–56). [Hu.g.russ.]

Tests showed that resistance to withdrawal from Poplar, Lime, and Alder, is roughly double, and from Oak and Beech roughly 4 times, that of Spruce. All these hardwoods can, therefore, be used instead of Spruce in built-up beams, etc. *From authors' summary.*

3330. NORÉN, B. Bultars bärförmåga i enskäriga träförband med särskild hänsyn till underläggsbrickornas storlek. **[The strength of bolted wood joints, especially the influence of washer size on strength and stiffness in single shear.]** *Medd. Svenska Träforsknlnst. (Trätekn. Avd.)* No. 22*B*, 1951. pp. 42. 6 refs. [Sw.sw.e.] P.R.

813. *Wood Chemistry*

See also Nos. 3226, 3296, 3345, 3455 *et seq.*

3331. CLERMONT, L. P., and SCHWARTZ, H. **The chemical composition of Canadian woods.** *Pulp Paper Mag. Can.* 52 (13), 1951 (102–5). 11 refs.

Analyses were made on samples from sound mature trees (10 of each species except White Pine) of *Picea glauca, P. mariana, Pinus banksiana, P. strobus, Tsuga canadensis, Betula papyrifera,* and *Populus tremuloides.* Thirty samples were taken per tree from the bottom, the middle and the top. A preliminary study made on the variation in composition of a Black Spruce at 8-ft. intervals up the stem showed considerable variations for some constituents; the calculated average for the bottom, middle and top disks together came very close to that for all disks together. In the main study, the hardwoods had higher pentosan, hemicellulose and acetyl contents and a lower lignin content than the softwoods. Alpha-cellulose values were close to 50% for all species except *B. papyrifera* (40%). Results of the analyses and figures showing the physical characteristics (height, d.b.h., age, sapwood %, and sp. gr.) of the trees sampled are tabulated.

3332. Études chimiques de diverses espèces de peupliers. **[Chemical studies of different species of Poplar.]** *Rapp. Fonds for. nat. Jan.–Juin 1951*, 1951 (52). [F.]

Tabulates analytical data (alcohol/benzene extractives, cellulose, lignin, furfurol index, and ash) for *Populus candicans, P. charkowiensis, P. 'setchuensis', P. simonii,* S.P. Hybrid 220 TH, and *P. 'virginiana typica'*. Preliminary results indicate that there are specific variations in cellulose and lignin contents, and that it may be possible to classify Poplars, according to their alcohol/benzene extractives, in groups that correspond to the botanical classification.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

3333. FREUDENBERG, K., and WILKE, G. Modelle zur Chemie des Lignins, insbesondere der Formaldehyd abspaltenden Gruppen. **[Lignin chemistry models, in particular for groups that split off formaldehyde.]** *Chem. Ber.* 85 (1), 1952 (78–85). 21 refs. [G.g.] P.R.

It is suggested that the substance which splits off formaldehyde when treated with hot 28% H_2SO_4 and which has been found by the authors in 2,3-diphenylpropandiol-(1,3) is related to lignin. Native lignin splits off less CH_2O than cuproxam lignin made from it and almost the same proportion of CH_2O as artificial lignin. A substituted phenoxy-cinnamaldehyde has been synthesized as a model of lignin or of one of its elements. *From authors' summary.*

3334. LINDGREN, B. O. **The sulphonatable groups of lignin.** *Svensk PappTidn.* 55 (3), 1952 (78–89). 81 refs. [E.e.] P.R.

The sulphonation of lignin is studied and a theory of the lignin structure discussed.

3335. SCHUERCH, C., JR. **A partial criterion [based on the methoxyl/carbon ratio] for the comparison of different lignins.** *J. Amer. chem. Soc.* 73 (10), 1951 (4997–9). 18 refs. [College of Forestry, State University of New York.] O.R.S.

3336. KUDZIN, S. F., DEBAUN, R. M., and NORD, F. F. **Investigations on lignin and lignification. VI. The comparative evaluation of native lignins.**

J. Amer. chem. Soc. 73 (10), 1951 (4615–8). 11 refs. (*Contribution from the Department of Chemistry and Enzymology, Fordham University*, No. 226.) O.R.S.

The native lignins of Scots Pine, Oak, Birch and Maple, and the native lignin obtained from Scots Pine after decay by *Lentinus lepideus*, were compared by physical and chemical methods. The lignins were methylated, oxidized, subjected to paper chromatography and tested for phenols. Results are given in graphs and a table, and infra-red spectra of the softwood lignins and of the methylated hardwood and softwood lignins are presented. The lignins from sound and decayed Pine contained the same number of methylatable groups, while the other lignins differed from the Pine and from each other. Only the lignin from Maple yielded syringaldehyde on oxidation. All lignins except that from Oak responded similarly to the phenol reagent. The lignins from sound and decayed Pine were identical in all points investigated.

3337. KUDZIN, S. F., and NORD, F. F. **Investigations on lignin and lignification. VII. Characterization of enzymatically liberated hardwood lignins.** *J. Amer. chem. Soc.* 73 (10), 1951 (4619–22). 3 refs. O.R.S.

The enzymatically-liberated lignins of Oak, Birch and Maple obtained by alcoholic extraction after 10 months' decay by *Daedalus quercina* were compared with the native lignin fractions of the same species. The native and enzymatically-liberated lignins of each species were identical in all respects studied. A nomenclature based on the presence of the guiacyl and syringyl grouping in lignins is proposed. *From authors' summary.*

3338. BUBLITZ, W. J. **An investigation of the carbohydrate fraction of Spruce chlorite liquors.** *Tappi* 34 (9), 1951 (427–32). 29 refs. P.R.

In the application of a modified method for the treatment of liquors derived from the $NaClO_2$ oxidation of Spruce wood [*Picea mariana*, average age 40 years] under conditions suggested for the quantitative isolation of holocellulose, a large alcohol-insoluble fraction, predominantly carbohydrate in nature, has been isolated. On analysis, this fraction yielded large amounts of mannose, galactose, and uronic acids, with smaller quantities of xylose and arabinose. Within the range of experimental cooking conditions, analogous fractions could be isolated from all chlorite liquors, even from oxidations under milder conditions than those previously suggested. It is evident that the use of $NaClO_2$ for the isolation of holocellulose is not a quantitative method for separation of lignin from carbohydrates; some carbohydrate material is removed before all the lignin is removed from the wood. *Author's summary.*

3339. TIMELL, T. E., and JAHN, E. C. **A study of the isolation and polymolecularity of Paper Birch holocellulose.** *Svensk PappTidn.* 54 (24), 1951 (831–46). 51 refs. [E.e.g.sw.] P.R.

Results of a study of the degree of polymerization and the polymolecularity of cellulose and hemicelluloses from *B. papyrifera* are tabulated. Different methods for the isolation of holocellulose from woods are compared.

3340. KOEPPEN, A. VON, and COHEN, W. E. **Sub-project C.1–5—Isolation and determination of the total carbohydrate fraction. Progress report No. 6. A study of the chlorite method for the isolation of holocellulose from *Eucalyptus regnans* F.v.M.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, Melbourne. 1951. pp. 23 + 1 dgm. 25 refs. P.R.

Temperature was found to be more critical than previously supposed; if it exceeds 70° C., a significant pentosan loss is sustained. At higher temperatures, the hemicelluloses form (through oxidation?) lignin-like materials. A two-stage method was developed (gradual addition of $NaClO_2$ with intervening washes) which gave satisfactory results.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 3293, 3309.

3341. ERDTMAN, H. **The phenolic constituents of Pine heartwood. V. The heartwood of *Pinus strobus*.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1157 (*a*), 1950. pp. 14. 20 refs. Transl. by E. Feigl from *Svensk kemisk Tidskrift, Stockholm* 56, 1944 (2–14). P.R.

Cf. *For. Abstr* 8 (No. 1834).

3342. GRIPENBERG, J. **Antibiotic substances from the heart wood of *Thuja plicata* D. Don. VII. A partial synthesis of thujic acid.** *Acta chem. Scand.* 5 (7/8), 1951 (995–1002). 7 refs. [E.] O.R.S.

Cf. *For. Abstr.* 11 (No. 1129).

813.4. Chemical Effects of Heat. Chemistry of Thermal Decomposition

See Nos. 3313–5, 3324, 3475.

813.5. Reaction with Metals

See No. 3446.

813.6. Effect of Chemicals on Wood. Resistance to Chemical Attack

See No. 3446.

813.8. Poisonous and Irritant Properties

3343. **Wood-worker skin diseases.** *Wood-Worker, Indianap.* 70 (12), 1952 (51–2). P.R.

Account of a survey (by L. Schwartz, Tulipan, and Peck) on dermatitis among carpenters and cabinet-makers. Toxic and irritating wood usually affects hands and forearms only, but wood dust may affect the face and other parts of the body. Dermatitis from toxic woods resembles that from Poison Ivy. Cases of skin lesions on hands, forearms, legs, waistline and groin, caused by Mahogany woods from Brazil and Honduras, were reported. The following species have been found to be irritant to sensitive persons: Mange tree, Mahogany, Birch, Macassar wood, Pines, Spruces, Brazilian Walnut, Brazilian Rosewood, Boxwood, Satinwood, Eucalyptus, Yew, and Basswood. Moist sawdust of freshly cut surfaces is usually most dangerous. Some species,

as Rungus wood, can produce severe skin trouble, when in the form of old and worn furniture.

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 3226, 3299, 3302, 3331, 3449.

3344. HIRAI, S. **Study on the distribution of moisture, the wood-density number (Raumdichtezahl), shrinkage, and percentage by volume of moisture, air space and wood substance in the green stem of Japanese Larch.** *Res. Bull. exp. For. Hokkaido Univ.* 15 (1), 1951 (97–150). 12 refs. [Jap.e.]

Measurements were made on samples taken at different heights from a number of trees ranging in age from 23 to 7 years. Results, showing the variations in the different properties with tree age, height above ground, position of sample in heartwood, transition zone or sapwood, and the variation with the position of the annual rings, are given in graphs and tables. [Cf. *For. Abstr.* 13 (No. 630).]

3345. WILDE, S. A., and PAUL, B. H. **Rate of growth and composition of wood of Quaking and Largetooth Aspen in relation to soil fertility.** *Transactions, Wisconsin Academy of Sciences, Arts and Letters, Madison* 40 (2), 1951 (245–50). 7 refs. K.

[Cf. *For. Abstr.* 13 (No. 3226).] Semi-mature Aspen stands were investigated on sandy soils in central Wisconsin. The growth of *Populus tremuloides* on soils with a reasonably high level of fertility was found to vary within site indexes 65–70; on such sites the sp. gr. of wood and the content of α-cellulose averaged 0·41 and 48·3%, respectively. In spite of the accessible ground-water table, growth on impoverished soils varied within site indexes 45–55, and showed a high % of decay from *Hypoxylon*. The low rate of growth was parallelled by an average sp. gr. of 0·38 and contents of α-cellulose of 44·2%. The pronounced deficiency of Mn and B may have been partly responsible for deterioration of Aspen on these sites. Because of good stocking and uniform conditions of light, the wood of semi-mature stands was found to be much less heterogeneous than that of the old stands. Analysis of younger stands is therefore suggested for all investigations dealing with the influence of environmental factors on the quantitative and qualitative productivity of the forest. The study indicated that, on similar sites, *P. grandidentata* produces wood of a lower sp. gr. and α-cellulose content than that of *P. tremuloides*, and that it is more exacting in respect of soil nutrients. *From authors' summary.*

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

See also No. 3277.

3346. WERTZ, B. **Zakład Mechanicznej Obróbki Drewna i jego działalność. [The Department of Mechanical Woodworking [of the Polish Forestry Research Institute in Cracow] and its activity.]** *Sylwan* 95 (3/4), 1951 (383–8). [Pol.pol.]

Describes its scope and activities (woodworking proper, steaming, and seasoning) and the programme of future work.

821. *Barking*

See also Nos. 2719, 3465.

3347. HILL, L. E. **Hydraulic barking—a summary.** *Tappi* 33 (4), 1950 (72*A*–82*A*). 14 refs. P.R.

A comprehensive account of the advantages of hydraulic barking, the principles of operation, and the design of over a dozen types of hydraulic barker now in use on the Pacific coast.

3348. **Trend towards whole log barkers.** *Lumberm.* 79 (1), 1952 (57–9, 120–1).

Discusses the advantages of whole-log over slab barking and describes some hydraulic barkers.

3349. HOGAN, B. **New, small log barking units.** *Wood, Chicago* 56 (11), 1951 (33). P.R.

Describes two new barking machines suitable for small logs and pulpwood: (1) the MURCO Adams-Clark portable friction barker made in the U.S.A., and (2) the Anderson pneumatic barker made in Sweden by Söderhamns Verkstader A.B., Söderhamn.

3350. CONWAY, E. M., and SCHNELL, R. L. **A portable drum post peeler.** Division of Forestry Relations, Tennessee Valley Authority. 1951. pp. 10.

Account, illustrated by a number of photos and diagrams, of an inexpensive and efficient portable machine developed by the T.V.A. Division of Forestry. Operated by a 2-man crew it will bark summer-cut Pine posts at the rate of ca. 90/hr.

822. *Saws and Sawing*

3351. SCHAUB, C. **Ramsågningens kinematik och kinetik. [The kinematics and kinetics of frame-sawing.]** *Teknisk Tidskrift, Stockholm* 81 (24), 1951 (517–20). [Sw.] L.S.

A theoretical study.

3352. HRYCYK, R. **Indykator trakowy pomysłu Zakładu Mechanicznej Obróbki Drewna. [Frame-saw indicator designed in the Department of Mechanical Woodworking [of the Polish Forestry Research Institute in Cracow].]** *Sylwan* 95 (3/4), 1951 (388–96). [Pol.pol.]

Illustrated description of an apparatus designed for recording graphically the correlation of the two fundamental motions of frame-saw conversion, viz. the reciprocating motion of the saw blades and the progressive motion of the log feed. Both of these motions are transferred on an appropriate scale on to the indicator tape, where a resultant curve of both motions is obtained. This graph, it is claimed, gives a simple and unambiguous representation of the work done by the frame-saw itself as well as of the operation of the feeding mechanism, the following data being derivable: (1) average feed rate, (2) the optimum value of saw overhang for a given feed rate, (3) the degree of uniformity of feed rate, and (4) 'chip' thickness during a single stroke of the saw.

3353. HRYCYK, R. **Uproszczony przyrząd do indykowania traków. [A simplified instrument for taking an indicator diagram of frame saws.]** *Sylwan* 95 (3/4), 1951 (396–8). [Pol.pol.]

Resembles that described in the preceding abstract. The range is only 250 mm. of cutting length, while the larger instrument is suitable for the whole log.

3354. ANDERSSON, J., SCHAUB, C., and SIMONSSON, Å. Ramsågblad med stukade tänder. **[Frame-saw blades with swage-set teeth.]** *Teknisk Tidskrift, Stockholm* 81 (24), 1951 (513–6). [Sw.] L.S.

Results of sawing 25,600 logs showed that swage-set blades (1) gave 10% less sawdust; (2) gave straighter sawn timber; (3) had as long a working life as chromium-plated spring-set blades; and (4) gave an equally good or better timber surface. [Cf. *For. Abstr.* 13 (No. 2465).]

3355. KLEM, G. G., and KARLSEN, O. Sammenliknende skurforsøk med sirkelsagblad med viggete og stukete tenner. **[Comparative study of sawing with circular sawblades having spring-set and swage-set teeth.]** *Medd. norsk tretekn. Inst.* No. 2, 1951. pp. 19 + 2 photos. [Nor.e.] (*Meddelelse fra Skogbrukets og Skogindustrienes Forskningsforening* No. 11). P.R.

The two types of blade were compared to show (1) power consumption, (2) saw kerf, (3) accuracy of lumber thickness, (4) characteristics of sawdust and (5) the appearance of the face of sawn goods. Four gauges were used for each type of blade and a total of 180 logs of *Pinus sylvestris* sawn. Results are tabulated. (1) The swage-set blades consumed more power than the spring-set blades, but the average increase in consumption would not be significant in practice. The difference was roughly the same for low and medium feeds, but was significantly reduced for high feeds (50 m./min.). (2) There was no difference in kerf thickness between the two blades. (3) (*a*) On an average for all gauges, swage-set blades cut more accurately than spring-set. (*b*) Fine-gauge blades of both types cut less accurately than heavier gauges. (*c*) The decrease in accuracy obtained with the finer gauges was less for swage-set than spring-set blades. (*d*) For the three heaviest gauges, rate of feed did not appear to affect accuracy of sawing for either type of blade. For the finest gauge, inaccuracy in both increased with increasing feed speed. (*e*) For both blades, large widths were sawn less accurately than small widths. (4) The sawdust from swage-set blades appeared to be rectangular in form; that from spring-set blades to be longer and thinner. (5) There was no difference in face appearance between sawn goods from the different blades. Further research is desirable.

3356. KLEM, G. G., and SEEM, M. En undersøkelse av skurunøyaktigheten ved forskjellige sagbrukstyper. **[Research on sawing accuracy of various types of sawmills.]** *Medd. norsk tretekn. Inst.* No. 3, 1951. pp. 11 + [2] + 3 dgms., 12 gphs., 7 tbls. [Nor.e.] P.R.

An investigation of 2,875 boards of different dimensions, produced by 34 sawmills using 6 gang-saws, 16 resaws with circular conical blades, and 16 twin circular log saws. Results showing (1) the variation in accuracy with the type of saw, and (2) the effect on timber consumption of the excess dimension allowed in sawing to ensure that all boards will be above the necessary minimum dimensions, are given in graphs and tables.

3357. KLEM, G. G., and KARLSEN, O. Skurutbyttets variasjon med skurordre, tømmerdimensjon og avsmalning ved en moderne sirkelsag. **[The variation in recovery from a modern circular saw according to [the amount of wane permitted by] different sawing rules, log dimension, and taper.]** *Medd. norsk tretekn. Inst.* No. 1, 1951. pp. 30. 5 refs. [Nor. nor.e.] (*Meddelelse fra Skogbrukets og Skogindustriens Forskningsforening* No. 7.) P.R.

Logs (2,000 in all) were converted according to four sawing rules, (1), (2) and (3) allowing wane in decreasing amounts, and (4), square-edged timber, allowing no wane. Recovery for all four rules increased by about 21% from small to large log dimensions, and decreased with decreasing amount of wane allowed. Recovery from (1) and (2), however, was roughly the same, and as the price received for (2) is 5% above that for (1), (2) should be more profitable. Lumber recovery from the largest logs (25–30 cm. mid-diameter) tended to decrease, probably because the sawing rules allowing less wane were used for these. Figures showing the variations in recovery, for the four rules, for different amounts of taper, are given in graphs and tables. The proportion of sawdust increased with decreasing amounts of wane allowed and decreased with increasing dimension. The proportion of slabs and edgings was lowest for (1) and (2), rather higher for (3) and highest for (4). It increased with decreasing log diameter.

3358. BAUMANN, W. Kreissägeblätter und ihre Kräfteeinwirkungen auf das Holz. **[Circular saw blades and the effect of their forces on timber.]** *Holz Roh- u. Werkstoff* 9 (11), 1951 (427–31). [G.g.] P.R.

The distribution of forces in circular saw-blades of various types is discussed. A blade should if possible be used in which, subject to the requirements of the cut, the horizontal cutting component is as small, and the vertical as large, as possible. The vertical component ought never to be directed upwards. The distribution of forces in a longitudinal cut is much more favourable than in a cross cut. Only new or machine-sharpened saw blades enable a clear picture of the distribution of the forces to be obtained.

3359. DRAKE, C. E. **Comparative operating costs of carbide tipped saws.** *Wood, Chicago* 56 (12), 1951 (26–7, 38, 40); 57 (1; 2), 1952 (28–9, 56, 60; 31–2). P.R.

Also deals with the various aspects of maintenance, tension, velocity, dulling, feed control, and sharpening, and analyses the new rules for sawing operations with the use of tungsten carbide.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning*

3360. STATHER, O. Kurzer Fräsdorn oder Fräsdorn mit Oberlager? **[Short milling arbor or a milling arbor with top bearing?]** *Holz Roh- u. Werkstoff* 9 (12), 1951 (461–3). [G.g.] P.R.

The milling arbor with top bearing is little if at all superior to the short milling arbor. The strength demanded by the new standard specifications should, it is suggested, be met by a short milling arbor of larger diameter.

824. *Forms of Joint. Jointing and Assembly*

824.1. Nailed Joints

See also Nos. 3328–9.

3361. STERN, E. G. **Nails and screws in wood assembly and construction.** *Prepr. U.S. For. Prod. Res. Soc.* No. 180, 1951. pp. 30. 41 refs. [Virginia Polytechnic Institute, Wood Research Laboratory, Blacksburg, Virginia.] P.R.

A general survey of nail and screw design, performance and manufacture, with special reference to helically threaded Screwtite nails, annularly threaded Stronghold nails, and Stronghold Screwnails with a small helix angle; also Twinfast wood screws. It is emphasized that, by using threaded-shank nails instead of screws, a decrease in assembly costs can be achieved, without any deterioration of the joints.

3362. STERN, E. G. **Efficiency of flooring nails.** *Bull. Va. polyt. Inst.* 44 (*4B*), 1951. pp. 8. P.R.

The greater efficiency of helically threaded flooring nails compared with plain-shank flooring brads or cut flooring nails is demonstrated by tests on axial withdrawal resistance. The average efficiency of the heavy cut flooring nail was 2·6 times greater, that of the light cut flooring or casing nail was 2·3 times greater, and that of the helically threaded Screwtite flooring nail was 3·3 and 3·4 times greater than that of the plain-shank flooring brads. *From author's abstract.*

3363. STERN, E. G. **Etched vs. threaded-shank nails.** *Sth. Lumberm.* 184 (2299), 1952 (39–40).

The resistance to withdrawal of etched plain-shank nails immediately after driving was greater than that of non-etched ones, but decreased more than that of non-etched ones when the test-plank was soaked and dried. The resistance of threaded nails was greater than for etched ones, decreased no more, and for some types even increased, when the plank was soaked and dried.

824.3. Bolted Joints

See No. 3330.

824.8. Glues and Gluing

See also Nos. 3368, 3381–2, 3448.

3364. TACHI, I., KIMURA, Y., and YAMAMOTO, A. **Studies on the adhesion of wood. 1. Some experiments with viscose pulp as an adhesive.** *Wood Res., Kyoto* No. 6, 1951 (20–33). 5 refs. [Jap.e.] X.

Non-maturating viscose pulp is suitable for use as an adhesive, if its viscosity is reduced by diluting with e.g. soya-bean glue to a 3% cellulose content.

3365. PERRY, T. D. **How hot presses developed.** *Wood, Chicago* 57 (2), 1952 (36, 38, 40). P.R.

A survey of the development of hot presses since 1930. The modern presses, both large and small (potential output ca. 9,000 and 2,000 sq. ft. per 8-hour shift, respectively), of single- and multiple-daylight type, for manufacturing plywood sheets or formed plywood, are described and illustrated or referred to.

3366. **A new machine for the woodworking industries.** *Cabinet Mkr.* No. 2717, 1951 (639). P.R.

An illustrated description of the G. E. C.-Fielding radio-frequency edge-gluing machine which extends the application of R.F. heating to the manufacture of blockboards or panels by edge gluing of strips of wood, thus rendering their mass production feasible. The machine has been designed for the production, from scantlings or offcuts, of boards 36–80 in. in length, up to 40 in. in width, and $\frac{1}{8}$–2 in. thick. Boards 80 × 40 × 1 in. have been made in 5 min. from strips 2 in. wide.

3367. SORSA, B. Eräiden lahosuoja-aineiden vaikutuksesta liimauksiin. **[The effect of some wood preservatives on gluing.]** *Pap. ja Puu* 34 (2), 1952 (28–30). 11 refs. [Fi.e.] P.R.

Tests were made on the strength of glue lines between blocks treated with water-soluble preservatives (Wollman, Boliden and Lahotuho-K33 salts) before or after gluing with resorcinol, phenol or urea glues. Results are tabulated. When gluing preceded preservation, there was no reduction of glue-line strength compared with untreated specimens. When preservation preceded gluing, satisfactory joints were obtained with resorcinol and phenolic glues, but poor joints with urea, especially after the blocks had been soaked in water. [Cf. *For. Abstr.* 13 (No. 1570).]

828. *General Carpentry and Joinery*

3368. CAMPREDON, J. Recherches diverses et essais intéressant l'utilisation du bois dans la menuiserie et la charpente. **[Research and tests on the use of wood in joinery and carpentry.]** *Ann. Inst. tech. Bâtim. Trav. publ., Paris* (*n.s.*) No. 107, 1949. pp. 23. [F.] D.S.I.R.

Includes reports on : (1) use of glue in carpentry; (2) the joining of window elements; (3) sundry paints, lacquers, and other coatings (tested on Beech for their moisture-proofing value); (4) tests on flush door (mechanical, and in relation to moisture); and (5) sawdust concrete.

829.1. *Finishing*

See also No. 3368.

3369. **Stains in wood.** *Ill. Carp. Build.* 141 (3881), 1952 (98). P.R.

Gives practical instructions for removing stains occurring (1) in woodwork, particularly of hardwood, near iron or other metal parts such as hinges, nails, screws, bolts, when exposed to weather and subjected to frequent wettings, and (2) in timber that has come in contact with wet concrete or mortar. Oxalic acid is recommended for the removal of the former, and HCl for the latter.

3370. [GRAHAM, P. H.] **Here's how to apply metal coating to your wood.** *Wood, Chicago* 57 (2), 1952 (27). P.R.

Describes the spray metallizing technique used for applying a metal coating (Al, Cu, Cd, Sn, Zn, Pb, Monel, steel, brass, bronze) to wood (Cypress, Birch, Gum, Mahogany, Oak, Redwood, Walnut). Zn is the usual primary coat metal, on top of which a metal like Cu is deposited, using the same technique.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

See also No. 3277.

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 3022, 3261, 3350, 3409–12.

3371. ODA, M. **The use of mining timber [in Japan]; demand and supply.** *For.* [*industr.*] *Econ., Tokyo* 3 (8–11), 1950 (21–31; 17–29; 15–21; 21–5); 4 (1; 3), 1951 (24–8; 15–23). [Jap.jap.]

A detailed study including: data on the location of mines; the various uses to which the timber is put; the species (88% *Pinus* spp.), quality and sizes required; quantities consumed and stocked; analyses of costs (particularly of transport, which is heavy) and prices; forest holdings of various mining concerns; the supply of competitive materials, e.g. steel props; timber decay and its prevention; and methods of forecasting timber needs.

3372. **Supports.** *Rep. Safety in Mines, Lond. 1948*, 1950 (76–9).

Reports tests on (1) seasoned Oak plugs for use with hydraulic props (a plug 4 in. in diameter and 2 in. long withstood 60 applications of 20 tons against a corrugated steel bar), and (2) withdrawal of props by means of a sylvester.

3373. PEREIRA, J. ARANHA, and MAINIERI, C. Madeiras brasileiras empregadas para dormentes (tentativa de uniformização da sua nomenclatura). **[Brazilian timbers used for sleepers—a tentative standardization of their nomenclature.]** *An. bras. Econ. flor., Inst. nac. Pinho* 2 (2), 1949 (224–50). 39 refs. [Port.e.]

Presents a list of vernacular names of timbers used in various regions, with their equivalent botanical names, and also a list of synonyms.

832. *Mills, Their Functions and Products*

832.1. Sawmills and Planing Mills

See also Nos. 3260, 3251 *et seq.*

3374. GRANTHAM, J. B. **Quality control in sawmill operations as practiced in class 'A' Douglas Fir mills.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (149–61). P.R.

Discusses the varying practice among the 160-odd plants in this class.

3375. TELFORD, C. J. **Small sawmill improvement. Practical pointers to field agencies. Instructions on sawing hardwood logs and edging and trimming hardwood lumber for grade and value recovery.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*899–27, 1951. pp. 6 + 17 photos. + 12 dgms. P.R.

3376. FECHNER, G. H. **Yellowpoplar [*Liriodendron tulipifera*] lumber grade yield recovery—a guide to improved cutting practices.** *J. For.* 49 (12), 1951 (888–94). 12 refs.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-wood Assemblies

See also Nos. 3249, 3365–6, 3416.

3377. CROCKETT, G. **A method of estimating the veneer yield from peeler logs.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 5 (2), 1951 (5–9).

Gives examples of a method, based on a nomogram, for calculating yield from circular and from elliptical and buttress-sectioned logs.

3378. PERKITNY, T., and WNUK, M. Badania orientacyjne nad przydatnością mieszańca olchy czarnej i szarej do wyrobu sklejek. **[Preliminary investigation on the suitability of *Alnus glutinosa* × *incana* for plywood manufacture.]** *Sylwan* 95 (3/4), 1951 (375–80). [Pol.pol.]

In comparative tests of the veneer yield from 1 cu.m. of raw material (*Alnus glutinosa* and *Alnus glutinosa* × *incana*) and of the tensile strength of the plywood along, across, and at 45° to, the grain of the face veneers, the hybrid appeared to be inferior to *A. glutinosa* in quality and quantity of yield, but roughly equal in strength.

3379. KRAEMER, O. **Grading rules for plywood (Instructions regarding quality and marking).** *Transl. For. Prod. Aust.* 1951. pp. 7. Transl. by K. Hirst from *Holztechnik* 30 (11), 1950 (313–4). P.R.

Cf. *For. Abstr.* 12 (No. 3146).

3380. BROTERO, F. A. Padrões de lâminas de pinho brasileiro. **[Standards for laminated Parana Pine.]** *An. bras. Econ. flor., Inst. nac. Pinho* 2 (2), 1949 (251–60). [Port.e.]

Suggested specifications applicable to *Araucaria angustifolia* and based on the standards of the [U.S.] National Hardwood Lumber Association, with definitions and suggested Portuguese equivalents of American terms relating to plywood.

3381. PRESTON, S. B. **The effect of fundamental glue-line properties on the strength of thin veneer laminates.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (228–40). 16 refs. P.R.

Strength properties of Yellow Poplar [*Liriodendron tulipifera*] veneer laminates (laminae thickness of from $\frac{1}{80}$ to $\frac{1}{20}$ in.) bonded with a phenol-resorcinol-formaldehyde adhesive were determined. Thinner laminae caused an increase in compression and in the sp. gr. of the product. The increase of tensile strength accompanying the decrease of lamina thickness was ca. twice as great as could be expected from the increase of sp. gr. Modulus of elasticity was the only flexural strength property that was improved by lamination. Young's modulus was found to be a hyperbolic function of the square of $\frac{1}{2}$ the ratio of span to depth. Pure modulus of elasticity determined directly was found to be closely comparable to that computed from the hyperbolic trend of the effective modulus of elasticity at various span/depth ratios. The effect of the fundamental glue-line properties on the strength of veneer laminates has been clearly established.

3382. TATTO, L. **Resistência de compensados ao cizalhamento. Estudo preliminar de cinco madeiras**

amazonicas coladas com resinas a frio. [Resistance of plywood in shear. Preliminary study of five Amazonian timbers glued with cold-setting glues.] *An. bras. Econ. flor., Inst. nac. Pinho* 2 (2), 1949 (269–81). 12 refs. [Port.e.]

Plywood made from *Swietenia macrophylla, Platymiscium* sp., *Euxylophora paraensis, Peltogyne densiflora* and *Bowdichia brasiliensis*, and glued with (1) casein, (2) resorcinol-formaldehyde, (3) urea-formaldehyde, and (4) phenol-formaldehyde glues, were tested in shear (*a*) dry, (*b*) after 24 hours' soaking, and (*c*) after undergoing the Douglas Fir exterior-type test. The cold-setting resins maintained their strength better than casein glue when soaked, and after the Douglas Fir exterior-type test; the resorcinol-formaldehyde glue proved as good as the phenol-formaldehyde one. *P. densiflora* and *B. brasiliensis* did not glue well with the urea-formaldehyde resin, while the resorcinol-formaldehyde resin did not give good bonds with *E. paraensis*. The casein glue stained the woods of *P. densiflora, B. brasiliensis* and *E. paraensis*. *S. macrophylla* and *Platymiscium* sp. glued well with all the adhesives tested.

3383. BETHEL, J. S., and CARTER, R. M. **Techniques in hardwood plywood quality control.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (162–9). 5 refs. P.R.

A discussion of statistical quality-control methods adapted to the problems of hardwood plywood manufacture. Statistical methods in controlling veneer moisture content are described in some detail, with special reference to the use of the Shewhart control charts. The latter can also be used for controlling the thickness of veneer, the dimensions in clipping, glue spread, glue-joint quality, and panel dimensions.

3384. HIRAI, S. **Properties of laminated woods of large dimensions, particularly those from softwood veneers.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (248–9). [Jap.e.]

Sp. gr., moisture content and strength properties of laminated improved woods from five conifers and two hardwood species are tabulated.

3385. FUJINO, K., and HORINO, T. **Studies on metal-wood plyplate. 1. Strength of iron-wood plyplate.** *Wood Res., Kyoto* No. 5, 1950 (49–54). [Jap.e.] X.

3386. FUJINO, K., and HIROTA, T. **Studies on metal-wood plyplate. 2. Strength of aluminium-wood plyplate.** *Wood Res., Kyoto* No. 5, 1950 (55–62). [Jap.e.] X.

3387. HUBKA, R. E., DOW, N. F., and SEIDE, P. **Relative structural efficiencies of flat Balsa-core sandwich and stiffened-panel construction.** *Technical Note, National Advisory Committee for Aeronautics, Washington, D.C.* No. 2514, 1951. pp. 29. 16 refs. P.R.

An analysis is made and charts are presented for the determination of regions of efficient application of flat Balsa-core sandwich and stiffened-panel construction for a large range of design requirements. Optimum sandwiches were found to have relatively low values of the ratio of core to face thickness. *Authors' summary.*

833. *Timber in Buildings and Engineering Structures (Manufacture and Use)*

3388. **Code of functional requirements of buildings. Chapter IX. Durability.** *British Standard Code of Practice, British Standards Institution, London* No. *CP3*–Chapter IX, 1950. pp. 35. P.R.

Pp. 22–3 deal with the susceptibility of timber to deterioration (fungal attack, insect attack, rodents).

833.1. Building Components and Fittings: General

See also Nos. 3362, 3368.

3389. **Timber flooring.** *British Standard Code of Practice, British Standards Institution, London* No. *CP201*, 1951. pp. 40. Price 3*s*. P.R.

3390. POOLE, J. R. M. **Timber suspended ground floors.** *Wood* 17 (2), 1952 (52–3).

Describes, with sectional drawings, the new suspended wood floor designed by the Timber Development Association.

833.8. Wood in Hydraulic, River and Marine Uses

See Nos. 3393, 3430.

834. *Shingles. Cooperage. Packing Containers*

See Nos. 3219, 3538.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Uses etc.*

See also No. 3312.

3391. HYLER, J. **Special equipment speeds long handle production.** *Wood, Chicago* 57 (1), 1952 (36). P.R.

Describes some of the latest aids for the production of long handles for shovels, rakes, hoes etc.

3392. MESEKE, W. A. Die Erzeugung von Bruyère-Holz in Griechenland. [**The production of briar-root [*Erica arborea*] in Greece.**] *Z. Weltforstw.* 14 (6), 1951 (196). [G.]

Describes the preparation of blocks for export, and gives figures for the weight and value of exports.

838. *Vehicles (including Ships, Boats, Aircraft)*

See also Nos. 3321, 3430.

3393. MONEY, P. L. **Marine uses of timber.** *J. Oxf. Univ. For. Soc. (Ser. 3)*, No. 6, 1952 (41–9).

Notes on species used for ship and boat building, coast defences, and docks and harbours, with a few remarks on marine borers.

3394. DUFF, M. G. **Decay in wood-built boats.** *Ship and Boat Builder, London* 5 (5), 1951 (173–7). P.R.

Summarizes the results of survey reports of 132 sea craft selected at random. Out of the 46 undecked boats examined, fungal decay was found in only 3; general decay in 4; dry wood borer in 1; marine borer (*Limnoria*) in 1. It is concluded that the general incidence of timber decay of a serious nature in open boats is very slight. Out of 86 decked boats examined, fungal decay was found in 67; general decay in 28 (of which 3 were 'severe' cases); chemical decay in 15 (1 'severe'); dry wood borer in 4 (1 'severe'); and marine borer in 17 (4 being 'severe'). It appears that ventilation is a major factor in preventing, as fresh water leakage through decks is in promoting, fungal decay; and that the preservative treatment of boat timber is in many cases impracticable.

839.8. *Industrial Waste Wood and its Uses*

See also Nos. 3368, 3466, 3471–4.

3395. WALTERS, C. S., FOX, H. W., and WYCOFF, H. B. **Composting coarse hardwood sawdust with a bacterial accelerator.** *J. For.* 49 (12), 1951 (910–1).

The use of a proprietary bacterial accelerator had no visible effect on composted hardwood sawdust, compared with sawdust composted without such treatment. [Cf. *For. Abstr.* 13 (No. 3019).]

3396. MACDONALD, M. D. **Manufacture of consolidated products from wood residues.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (289–97). 6 refs. P.R.

General information on the manufacture of boards, moulded shapes, die-pressed materials and the like from wood waste (e.g. planer shavings) with the use of modern synthetic-resin binders.

3397. GRANUM, H. Kutterflis og sagflis som isolasjonsmateriale i bolighus. **[Shavings and sawdust as insulation in buildings.]** *Utredn. norsk tretekn. Inst.* No. 1, 1951. pp. 33. 17 refs. [Nor. nor.e.] P.R.

An account of experience of their use in Sweden, Finland and country districts of Norway, with figures showing their insulating properties, and illustrations of constructional designs. [Cf. *For. Abstr.* 13 (No. 719).]

3398. MĄCZEWSKI-ROWIŃSKI, B., and CZEREYSKI, K. Próba zastosowania brykietów z trocin jako paliwa do pojazdów gazogeneratorowych. **[Experiments with sawdust briquettes as fuel for gas-producer vehicles.]** *Sylwan* 95 (2), 1951 (254–72). 11 refs. [Pol.pol.]

Presents the results of comparative test drives conducted with a motor-car and a tractor, using as the gas-producer fuel Beech blocks, mixed Beech and Ash blocks, and Pine and Spruce sawdust briquettes compressed without binder at 150° and at 300° C. (the latter method being the subject of a Polish Patent granted to A. Stanislawski in 1950). The briquettes were found to be a useful gas-producer fuel, their advantages compared with hardwood blocks being greater range of the vehicle for each full charge of the producer, and better yield per 1 kg. of fuel. The only drawback is a larger quantity of residue.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

See also No. 3388.

841. *Wood Preservation*

See also Nos. 3022, 3277, 3367, 3420, 3426–31, 3435, 3437.

3399. PERKITNY, T. Działalność Zakładu Ulepszania Drewna w Bydgoszczy. **[The activity of the Department of Wood Improvement [of the Polish Forestry Research Institute] at Bydgoszcz.]** *Sylwan* 95 (3/4), 1951 (366–74). 35 refs. [Pol.pol.]

Describes the scope of its activities (wood preservation, and composite wood materials) and the work done since its inception. A list of publications is appended.

3400. **Record of the first annual convention of the British Wood Preserving Association.** British Wood Preserving Association, 21 College Hill, London, E.C.4. 1951. pp. 196.

Contains papers discussed at the Association's first meeting, since its reorganization in 1949, held at Cambridge 25–27 July, 1951. Abbreviation in *For. Abstr.*: *Rec.* [*1st* etc.] *Conv. Brit. Wood Pres. Ass.*

3401. COX, H. A. **Some recent activities.** *Rec. 1st Conv. Brit. Wood Pres. Ass.* 1951 (175–81). 17 refs.

Summarizes briefly recent developments, and lists some publications, with items arranged under countries.

3402. BELLMANN, H. Der Grenzwert der Schutzflüssigkeit. **[The threshold value of the solution of a preservative.]** *Holz Roh- u. Werkstoff* 9 (7), 1951 (270–3). 6 refs. [G.g.] P.R.

The notion of the 'threshold value' of a preservative substance has the disadvantage of lacking a uniform basis of reference. This is the cause of some discrepancies observed between test results and actual experience. Better results may be expected from the use of the notion of the threshold value of the 'preserving liquid', which can be computed from the other threshold value by introducing the concentration used. Thus a preservative used in an aqueous solution of 20% concentration, has a threshold value of 12 kg./cu.m. (if the preservative substance alone is taken into account), but 60 kg./cu.m. if the solution is regarded as the preservative agent. When comparing e.g. carbolineum with $HgCl_2$ as preservatives, the former must be placed higher than the latter because carbolineum can be used undiluted whereas the solubility of $HgCl_2$ being only 0·67%, its efficiency is reduced by a factor of ca. $\frac{1}{150}$ and carbolineum is the more efficient preservative.

3403. FINDLAY, W. P. K. **The value of laboratory tests on wood preservatives [with discussion].** *Rec. 1st Conv. Brit. Wood Pres. Ass.* 1951 (3–10, 19–36). **[Forest Products Research Laboratory, Princes Risborough.]**

Discusses methods used, and the validity of laboratory tests on toxicity, permanence, penetration, reaction with other materials, toxicity to animals and humans, and paintability of treated timber, for preservatives against fungus attack.

3404. EECKHOUT, L. Orienterend onderzoek naar de eigenschappen van creosoot en zijn componenten als houtbeschuttingsmiddelen. **[Preliminary research on the properties of creosote and its constituents as wood preservatives.]** *Meded. Lab. Houttechnol., Gent* No. 8, 1951. pp. 53. 100 refs. [Flem.flem.f.e.g.]

Literature on creosote is discussed, and conclusions from it on the toxicity of creosote and its fractions are summarized. Four fractions, (1) with b.p. up to 242° C., (2) b.p. 242–292°, (3) b.p. 292–342°, and (4) the residue, were obtained from creosote used for preserving sleepers. Fractions (2) and (3) were the most and (4) the least toxic to *Coniophora cerebella* on a culture medium. In wood-block tests, fractions (1)–(3) were very toxic, and creosote less so, while fraction (4) had practically no effect. After weathering tests (leaching and exposure to ultra-violet and infra-red rays) the heavier fractions (3) and (4) were more toxic than fractions (1) and (2). In future tests, 6 fractions with b.p. up to 210, 210–235, 235–270, 270–315, 315–355°, and the residue, will be compared, using *Polystictus versicolor* on Beech and *Lentinus lepideus* on Pine sapwood.

3405. BECKER, G., and WIEDERHOLT, W. Fluosilicathaltige Gemische für den Holzschutz mit herabgesetzter eisenschädigender Wirkung. **[Fluosilicate-containing wood-preserving mixtures with reduced corrosiveness to iron.]** *Holz Roh- u. Werkstoff* 9 (11), 1951 (409–16). 14 refs. [G.g.] P.R.

It was found that, when an iron sheet is dipped into a preservative solution, the corrosion is much reduced if H_2SiF_6 is mixed in certain proportions with an alkali monofluoride, with or without $ZnSiF_6$. Corrosion studies of screws inserted into treated wood showed that mixtures containing $ZnSiF_6$ reduced the corrosion most. Finally, no gaseous corrosion (iron sheet suspended near a treated piece of wood) could be detected if the preservative contained $H_2SiF_6 + NH_4F$ (with or without $ZnSiF_6$). Although the penetration of binary mixtures (without $ZnSiF_6$) is somewhat greater than that of ternary ones, the latter are recommended because of their lesser corrosiveness. These mixtures are efficient fungicides, and could possibly be used for protection against house insects though probably not against *Hylotrupes bajulus*.

3406. PERKITNY, T., and CHUDZIŃSKI, Z. Wpływ nasycania preparatem 'Fluralsil', przemysłową solą kuchenną i fluorokrzemianem sodowym na mechaniczne własności drewna sosnowego. **[The effect of impregnation with 'Fluralsil' preparation, commercial NaCl, and Na_2SiF_6 on the mechanical properties of Pine timber.]** *Sylwan* 95 (3/4), 1951 (381–3). [Pol.pol.]

No perceptible decrease in mechanical strength (compression and bending tests) could be detected 3 months after the impregnation of Pine test specimens with 'Fluralsil' preparation, commercial NaCl, or Na_2SiF_6. Samples from pitprops impregnated with commercial NaCl 18 years before, did not show any loss of strength.

3407. BLEW, J. O. **Comparison of wood preservatives in stake tests (1951 progress report).** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1761, 1951. pp. 7 + 1 photo, 22 tbls. P.R.

Southern Yellow Pine untreated stakes 2 × 4 × 18 in. have had an average life of ca. 1 year in the Canal Zone, 2–3 years in Mississippi, Florida, and Louisiana, and ca. 6 years in Wisconsin. Superficial treatments by dipping and brushing with preservatives such as coal-tar creosote and petroleum oils containing Cu naphthenate, Zn naphthenate, phenyl Hg oleate, and pentachlorophenol, have added from a few months to 4 years to their life. Water-borne preservatives such as $ZnCl_2$, chromated $ZnCl_2$, Tanalith, and Na pentachlorophenate, have provided less protection than the standard preservative oils such as coal-tar creosote and pentachlorophenol solutions when preservative retentions have corresponded to those in commercial use. Untreated Douglas-Fir plywood stakes have not lasted longer than stakes of the same thickness cut from Douglas-Fir timber. *From author's summary.*

3408. BAECHLER, R. H. **Naval stores and derivatives as wood preservatives.** *Sth. Lumberm.* 183 (2297), 1951 (160–2).

Laboratory tests of toxicity by the agar-flask method were made. When part of the pentachlorophenol in a standard 5% solution was replaced by rosin, oleo-resin, drop liquor concentrate, rosin oil or ester gum, the resulting solutions possessed good initial toxicity. A number of oils produced by thermal cracking of rosin and oleo-resin killed the test organism at fairly low concentrations; as a rule, the most toxic oils were produced at the higher cracking temperatures but higher toxicity appeared to be at the expense of yield. Products formed by the hydrogenation as well as by the oxidation of rosin showed very low toxicity. Promising results were obtained from complexes of $HgCl_2$, $CuCl_2$, $ZnCl_2$, and Cu acetate prepared with Rosin Amine D; the acetate, caprylate, caprate, chlorobenzoate, ortho-phenylphenolate, borate and arsenate of Rosin Amine D; and several products formed by the hydrolysis of chlorinated rosin and oleo-resin. Some field tests will be started early in 1952.

3409. WALTERS, C. S., and MEEK, W. L. **Report on project 301-C. Preservative treatment of fence posts with toxic oil solutions by cold-soaking, dipping, and brushing.** *For. Note Ill. agric. Exp. Sta.* No. 29, 1951. pp. 3.

Cf. *For. Abstr.* 12 (No. 2196).

3410. ROTHWELL, W. **Preservation of railway sleepers [with discussion].** *Rec. 1st Conv. Brit. Wood Pres. Ass.* 1951 (105–28). [London Midland Region, British Railways.]

Gives an account of British practice in methods, preservatives, choice of species, and sleeper life. The discussion also covers a paper by C. Greaves on preservation of sleepers in Canada. [Cf. *For. Abstr.* 13 (No. 1642).]

3411. PROCHOWNIK, S. Podkłady bukowe w kolejnictwie oraz sposoby ich nasycania z uwzględnieniem tzw. zamrozi. **[Beech railway sleepers and methods of impregnating them, with special reference to 'frost heart'.]** *Sylwan* 95 (3/4), 1951 (343–57). 12 refs. [Pol.russ.]

[Cf. *For. Abstr.* 13 (No. 3296).] Up to the severe winter of 1928–9, Beech sleepers in Poland were pressure-impregnated with $ZnCl_2$ or creosote oil, or both, some of the sleepers having been used for 40 years. As all Beech stands in Poland were affected by 'frost heart' as a result of the severe winter, no Beech sleepers were made in 1931–8. In 1937–8, a method was evolved in the Polish State Impregnation Plants for impregnating Beech sleepers having frost heart and false heartwood. The sleepers were divided into 3 categories: (1) frost heart and false heartwood occupying less than $\frac{1}{3}$ of the cross-section area, (2) frost heart and false heartwood occupying from $\frac{1}{3}$ to $\frac{2}{3}$ of the cross section area, the distance between the frost-heart edge and the external surface being not less than 2 cm., and (3) all other sleepers. The first group were impregnated with 1 : 5 Tetazet (a $ZnCl_2$/creosote oil emulsion, with the addition of tannin and butyric acid); all other sleepers were treated first with $ZnCl_2$ solution (244 kg. of a solution of 3·9° Baumé/cu.m.) and then with creosote oil (110 kg./cu.m.). The results obtained were very encouraging. The paper ends with a list of conditions from stump to pressure plant, that ought to be observed in order to produce durable Beech sleepers.

3412. JANICZEK, M., and STEBNICKA, E. Przydatność drewna bukowego do wyrobu podkładów kolejowych. **[Suitability of Beech wood for railway sleepers.]** *Sylwan* 95 (2), 1951 (276–86). 8 refs. [Pol.pol.]

Presents the results of tests conducted on 120 Beech sleepers with various proportions of false heartwood and frost heart. After the moisture content had been reduced to less than 25%, the sleepers were impregnated with creosote oil or with a mixture of creosote oil with NaF, by the Rüping process. Investigation of both the impregnation samples and entire sleepers showed that Beech wood with false heartwood and frost heart absorbs the above-mentioned preservatives and is suitable for railway sleepers. [Cf. *For. Abstr.* 12 (No. 2211).]

3413. HICKSON, H. E. **The value of service records in wood preservation [with discussion].** *Rec. 1st Conv. Brit. Wood Pres. Ass.* 1951 (11–36).

Discusses the value of service records kept by users of treated timber, outlines the work of the American Wood-Preservers' Association in this field, and recommends the setting up of a committee for recording service records, and publishing them regularly.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

See also No. 3384.

3414. H., W. Q. **Reinforced lumber.** *Industr. Engng. Chem.* 42 (11), 1950 (10*A*, 14*A*, 18*A*). P.R.

An account of recent achievements in the impregnation of wood with molten metals.

843. *Fireproofing and Fire Resistance*

3415. SCHUCH, K. Untersuchungen über den quantitativen Nachweis der Feuerschutzmittel auf Phosphatbasis. **[The quantitative assessment of fireproofing agents with a phosphate basis.]** *Holzforschung, Berlin* 5 (3), 1951 (74–80). 2 refs. [G.g.e.] P.R.

A detailed description of an analytical method developed for determining the P_2O_5 content of phosphate fireproofing agents. It was found that silicofluorides present do not interfere. Methods of taking average samples of wood, and a special auger bit are described. The samples are tested for the presence and proportion of P_2O_5 at various levels below the surface. It was found that the degree of penetration of the fireproofing agent applied with a brush or spray was highly irregular, and that the whole of the phosphate was found in the first 1 mm. of surface layer, shortly after application.

3416. Ignifugation des placages. **[Fireproofing of veneer.]** *Rapp. Fonds for. nat. Jan.-Juin 1951*, 1951 (50–1). [F.] [Institut national du Bois.]

Experiments were made in the fireproofing of veneer by soaking at atmospheric pressure in an aqueous solution of 'phosphate mono-ammonique' [$?(NH_4)_2HPO_4$], before making up into plywood. It was found that air-dry veneers were treated less easily than those fresh from the cutter, that speed of impregnation varied with species as well as with thickness of veneer, and that saturated solutions gave much more satisfactory and rapid impregnation than weaker solutions.

3417. SIMMS, D. L. **Fire hazards of timber [with discussion].** *Rec. 1st Conv. Brit. Wood Pres. Ass.* 1951 (72–90). 4 refs.

Discusses and tabulates figures of critical intensities for ignition and for the spread of flame, for untreated woods of different species, painted surfaces, and fibreboard treated with different fire-retardants.

844. *Attack by Plant Organisms*

See also No. 3296.

844.1. Sap-staining Fungi

See also No. 3463.

3418. MATHIESEN, A. Über einige mit Borkenkäfern assoziierte Bläuepilze in Schweden. **[Some blue-stain fungi associated with barkbeetles in Sweden.]** *Oikos* 2 (2), 1950 (1952), (275–308). 42 refs. [G.g.] Cf. *For. Abstr.* 13 (No. 971).

3419. BAKSHI, B. K. **Studies on four species of *Ceratocystis* with a discussion on fungi causing sap-stain in Britain.** *Mycol. Pap. Commonw. mycol. Inst.* No. 35, 1951. pp. 16 + 3 plates. 31 refs.

Four species of *Ceratocystis* are described, of which three are proposed as new species, and the fourth is recorded for the first time in Britain. The generic name *Ceratocystis* has been adopted as an earlier synonym of *Endoconidiophora*. *C. coerulescens*, *C. longirostellata*, and *C. galeiformis* have been

found to be homothallic; *C. wilsoni* is heterothallic. The rôle of *C. pini* in the bluing of conifers in Britain is considered to be doubtful. *Leptographium lundbergii*, isolated from blued Pine boards as well as from ambrosia-beetle galleries, has been found to be a severe bluing agent. *C. coerulescens* is a moderately strong, and *C. piceae* and *C. galeiformis* are mild bluing agents. *C. longirostellata* produces a blackish grey discoloration on wood. *From author's summary.*

3420. Orłoś, H. Badania nad zwalczaniem sinizny drewna w Polsce. **[Investigations on the control of blue-stain in Poland.]** *Prace Inst. Bad. Leśn.* No. 70, 1951. pp. 59 + 3 tbls. 33 refs. [Pol.russ.]

Presents the results of studies conducted by the Section of Phytopathology of the Polish Forest Research Institute. It has been found that the main cause of blue-stain in timber is inadequate conditions of storage (lack of space, humidity, and insufficient ventilation); another cause is summer felling and long delays in conversion. To reduce the incidence of blue-stain, storage conditions should be improved and trees should be felled in winter and converted early. Converted timber ought to be piled in an E.–W. direction, with pieces containing most sapwood along the southern edge. Chemical treatment of converted timber is recommended. Borax, $Na_2S_2O_3$, $NaHCO_3$, and a chlorophenol preparation were tried, and the best results were obtained with a 10% solution of $NaHCO_3$. The ends of summer-felled trees should be treated by brushing on a 50% solution of $ZnCl_2$; when the surface is dry a coat of undiluted water-glass (or a paste made of 10 parts turbine oil, 30 of crude Pine oleoresin, 4 of white clay, and 2 of powdered PbO) is applied with a wooden trowel.

844.2. Wood-destroying Fungi

See also Nos. 3097–3103, 3328, 3336–7, 3394, 3434, 3463–4.

3421. Conservation des souches sous huile minérale. **[The preservation of fungus strains in mineral oil.]** *Rapp. Fonds for. nat. Jan.–Juin 1951*, 1951 (49). [F.] [Institut national du Bois.]

Experiments begun in 1949 have given preliminary results demonstrating the possibility of preserving strains of wood-destroying fungi in mineral oil by sub-culturing them only every 18 months or 2 years. The vigour and destructive power of the strains appear to be increased. Further experiments are being carried out with, among others, *Lentinus degener* on Beech.

3422. Akai, S., and Terasita, T. **On the Bavendamm's reaction of some wood-destroying fungi.** *Wood Res., Kyoto* No. 5, 1950 (43–8). 9 refs. [Jap.e.] X.

The colour reaction and the phenol-oxidase reaction of six lignin-dissolving fungi (*Fomes torulosus, Polyporus gilvus, Pleurotus ostreatus, Cortinellus berkeleyanus*, and *Pholiota adiposa*), were found to be positive, and those of two cellulose-decomposing fungi (*Lentinus lepideus* and *Fomes pinicola*) negative. The first group cause white and the second brown rots of wood.

3423. Akai, S., and Hibino, K. **On the relative resistance of some coniferous woods to fungus decay.** *Wood Res., Kyoto* No. 5, 1950 (30–6). 15 refs. [Jap.e.] X.

Resistance of *Chamaecyparis obtusa, Cryptomeria japonica, Pinus densiflora, Picea glehnii, Abies firma, Tsuga sieboldii* and *Pseudotsuga taxifolia* was tested with 9 species of fungus. *C. obtusa* and *P. taxifolia* were most, and *A. firma* and *T. sieboldii* least resistant. The most virulent species of lignin-decomposing fungus was *Polyporus sanguineus* with an average decrease of 7% in dry weight of wood blocks, and the least virulent *Schizophyllum commune* with 2%. The most active cellulose-decomposing fungus was *Fomes pinicola*, which produced 16 and 14% reduction in dry weight of *Tsuga* and *Abies* respectively. Full data are given in tables with English captions.

3424. Akai, S., and Nagatomo, I. **On the relative resistance of Beech wood to fungal attack.** *Wood Res., Kyoto* No. 5, 1950 (37–42). 14 refs. [Jap.e.] X.

Results of tests of *Fagus crenata* with 9 species of wood-destroying fungi. *Fomes pomaceus* caused most (26·57% loss of dry weight) and *Schizophyllum commune* least (2·43%) damage.

3425. **Discussion of paper on some properties of old-growth Douglas Fir decayed by *Fomes pini*.** *Bull. Amer. Soc. Test. Mater.* No. 177, 1951 (40–1). P.R.

Cf. *For. Abstr.* 13 (No. 632).

844.4. Control and Prevention

See also No. 3420.

3426. Findlay, W. P. K., and Vernon, J. W. **A simple method for testing the toxicity of volatile antiseptics to wood-rotting fungi.** *Ann. appl. Biol.* 38 (4), 1951 (876–80). 8 refs. [Forest Products Research Laboratory, Princes Risborough.] O.R.E.

Test fungi were cultured on a known volume (20 ml.) of filtered malt agar medium at the bottom of 500-ml., stoppered, conical flasks. When the fungus colony had reached a width of about 3 cm. its mean diameter was measured from below. The toxic chemical was dissolved in a highly volatile solvent, and 1 ml. of the solution added dropwise to 15-cm.-diam. fluted filter-paper. This was allowed to hang freely in the air for up to 1 min. to allow the solvent to evaporate, and was then introduced into the flask. The flasks were further incubated at 22° C. and the size of the colony examined after 24, 48, 72 and 96 hr. If no further growth occurred transplants were taken from the edge of the colony and placed on fresh medium, to find whether the fungus had been killed or merely inhibited. Summarized results of tests of 14 substances on 4 wood-rotting fungi are given. Such results may find application where the mycelium and spores are freely exposed, but tests with wood blocks indicated that, if infected wood of any appreciable thickness is to be sterilized, information about the penetration of the vapour across the grain of the wood, and about its sorption by the wood, must be obtained before any treating schedule can be drawn up.

3427. ALLIOT, H. **Results of research on the chemical protection of green timbers.** *Rec. 1st Conv. Brit. Wood Pres. Ass.* 1951 (145–51).

Discusses the preservation of freshly felled timbers (logs and green sawn timber) with chlorophenols, especially the Cryptogil preparations. [Cf. *For. Abstr.* 12 (No. 1224).]

3428. PECHMANN, H. VON. Über den Schutz gefällten Buchenholzes gegen Verfärbung und Pilzangriff. Erfahrungen mit dem Buchenschutzmittel 'Bayer-Buchenschutz und Basiment'. **[The protection of felled Beech against brown stain and fungus attack. Experiments with the Beech preservative 'Bayer-Buchenschutz und Basiment'.]** *Forstwiss. Cbl.* 70 (11), 1951 (676–91). 8 refs. [G.]

To test the effectiveness of the preservative a number of Beech stems were felled in spring, painted immediately after felling and left, with controls, in the forest until the autumn under a wide variety of conditions. Only under very adverse conditions, i.e. on a south aspect and among high weed growth, was any stain or serious fungus attack found on treated logs, whereas both were found in controls. Strength tests confirmed these findings.

3429. LINDGREN, R. M. **Reducing deterioration in stored Pine pulpwood.** *Sth. For. Note Sth. For. Exp. Sta.* No. 76, 1951 (1–3).

Studies have been made since 1948 in Louisiana, Mississippi and Arkansas. Deterioration, as measured by losses in sp. gr., of rough untreated wood is, in summer and winter respectively, 2–4% and 0–1·5% in 2 months; 6–8% and 1·5–3% in 4 months; and 8–10% and 3–5% in 6 months; and 11–15% for a full year. Losses will tend to be high if the bolts are small (4–5 in. diam.) or are stored in small piles. Peeled wood deteriorates less consistently than rough wood. For wood of less than 8 in. diam., losses may range from 2 to 7% after 4 months and 3 to 9% after 1 year. Most deterioration occurs in the first 4 months and later losses are slow and erratic. Large bolts, however, deteriorate slowly over longer periods, so that loss after 1 year may be almost double that for smaller bolts. Damage to rough wood can be reduced by: cutting and storing during autumn and winter if storage is for less than 1 year; storing large, long bolts; storing in large unaerated piles; and spraying ends of freshly cut bolts with a 4% solution of NaF in water. Damage to peeled wood can be reduced by: improving ventilation in piles; storing small bolts or large ones split; spraying or dipping bolts in 4% NaF and water; and cutting and storing during autumn or winter.

845. *Attack by Animals*

845.1. Marine Borers

See also No. 3393.

3430. **Proceedings [of the] Wrightsville Beach marine conference.** *Publ. nat. Res. Coun., Wash.* No. 203, 1951. pp. iii + 59. Price $0·50.

A conference on marine borers, their biology and control, was held under the auspices of the International Nickel Co. Inc., and the Prevention of Deterioration Centre of the National Research Council. Summaries are given of the following papers: Current navy problems in structure failure (Adm. *J. F. Jelley*); Field problems in the general maintenance of marine structures (Adm. *A. D. Alexis*); Concrete piles and their protection in harbour construction (*H. K. Cook*); Co-ordination needed in marine-borer research (*G. M. Hunt*); The marine-borer problem in Los Angeles harbour (*C. M. Wakeman* and *H. Schiller*); The physiology of marine borers (*F. G. Walton Smith*); The diet of *Teredo pedicellata* (*C. E. Lane*); Marine-borer work at the Clapp laboratories (*W. F. Clapp*); Current marine-borer research on the Pacific Coast (*R. J. Menzies*). Recent progress in preventing marine-borer damage to hulls of wooden ships (*J. G. Kuenzel*); Yards and docks research on marine-borer problems (Cdr. *K. C. Tyrrell*); and New approaches in marine biology (*J. Field*).

3431. MCKENNIS, H. **Treatment of wood with aqueous solutions.** *Technical Report, Naval Civil Engineering Laboratory, Solomons, Md.* No. 004, 1949. pp. 30 + 2 photos. 9 refs. D.S.I.R.

Presents the results of a preliminary investigation on methods and materials for protecting wood against marine borers, using inorganic chemicals. Some surface-active agents were found to have a beneficial effect on impregnation. In particular, non-ionic wetting agents favoured the penetration of heavy metal ions into wood. The paper also includes an initial study on the use of the corrosion products of iron against marine borers.

845.2. Terrestrial Borers

See also Nos. 3427, 3464.

3432. SISLEY, C. **The increase in infestations of the furniture beetle.** *Timber News* 59 (2148), 1951 (428–9). (Monthly Bulletin of the British Wood Preserving Association, October, 1951.)

A theory is advanced to explain the increase in the population of the furniture beetle [cf. *For. Abstr.* 12 (No. 401)]. Before 1914, *Anobium punctatum* was found mostly in furniture made of well seasoned, and often polished and cleaned hardwood, and the life cycle of the larvae was not less than 3–4 years. After 1914–18, softwood timber used for house building contained a very much higher % of sapwood than before, and this sapwood is increasingly chosen by the beetle for oviposition. Slightly damp softwood is thus a new habitat for the beetles, and its sugar and starch content has brought about a shorter life cycle (ca. 2 years). Another factor is the increasing use of plywood, in which the life cycle is often only a year.

3433. HICKIN, N. E. **The status of the common furniture beetle in Britain.** *Rec. 1st Conv. Brit. Wood Pres. Ass.* 1951 (169–74).

Discusses the relative importance of various species of wood-boring beetles, a theory to account for the increase of infestations by *Anobium punctatum*, and parasites and predators.

3434. BUTOVITSCH, V. Erhebungen über das Vorkommen und den Schaden der Holzschädlinge in Wohnhäusern in Südschweden. **[Survey of the**

occurrence and amount of damage caused by insects and fungi destructive to timber in dwelling houses in southern Sweden.] *Z. angew. Ent.* 33 (1/2), 1951 (172–86). 7 refs. [G.g.]

[Cf. *For. Abstr.* 13 (No. 1657).] Presents data on the extent of attack, type and age of building, part of the building attacked and costs of control and repairs. The following insects and fungi are dealt with: *Hylotrupes bajulus*, *Anobium punctatum*, *A. pertinax*; *Callidium violaceum*, *Ernobius mollis*, *Sirex* sp., *Merulius lacrymans* and *Coniophora cerebella*.

3435. [COKLEY, K.] **Treatment schedules for the impregnation of timbers susceptible to the powder post beetle [*Lyctus brunneus*].** *Aust. Timb. J.* 17 (9), 1951 (642–8).

Groups over 100 species according to the density of the wood and recommends treating schedules for each group.

3436. **Bionomics of ambrosia beetles.** *Rep. For. Adm. Malaya 1950*, 1951 (12–3).

Particular attention was paid to the problem of the cause of initial attraction of swarming ambrosia beetles to their host. The data so far obtained from numerous observations and small experiments suggest that an attractant is formed in the sapwood as a result of a pathological condition which may be very slight, such as a slight decrease in vigour of the tree. The essential process is probably fermentation, but the actual product of fermentation that forms the attractant is still uncertain. The sapwood of freshly felled or sawn timber is powerfully attractive, and ambrosia beetles do not normally attack wood when sapwood is absent. Variation in liability to attack in different species probably depends on the characteristic moisture content, timbers with a high moisture content being the most susceptible to infestation.

3437. **Control of ambrosia beetles.** *Rep. For. Adm. Malaya 1950*, 1951 (13–4).

Formaldehyde (5%), pentachlorophenol (2%) and Na pentachlorophenate (2%) were ineffective when applied to bark, but peeled logs treated with these compounds were much less heavily attacked than controls. It is concluded that direct application to wood rendered the logs unattractive, probably by inhibiting fermentation.

3438. **Meranti shot-hole borer.** *Rep. For. Adm. Malaya 1950*, 1951 (13).

Crossotarsus impar finds optimum conditions in areas of high and uniform rainfall and is comparatively rare where rainfall is less than 80 in. p.a. or is mainly seasonal. The essential factor, however, is not rainfall as such, but humidity, and the general trend is therefore modified by local conditions, e.g. the borer is abundant in swamps and rare on well drained steep slopes.

3439. HADLINGTON, P. **Siricid wasps (wood wasps).** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 5 (2), 1951 (16–21).

Outlines existing methods of treating imported infested timber at port or in the ship's hold. Experiments on the efficacy of MeBr on block-stacked timber in a fumigation chamber and under canvas sheeting are proposed.

847. *Drying* (*Seasoning*)

See also No. 3317.

3440. MAKU, T. **Studies on the drying of wood. I.** *Wood Res., Kyoto* No. 6, 1951 (51–70). 20 refs. [Jap.é.] X.

Experiments were made in the drying of wood with different initial moisture contents (m.c.) at 55° C., 40% relative humidity, in a 0·4–0·5 m./sec. air current, to test the applicability of Fourier's equation relating m.c. and drying time. It was found that when initial m.c. was below fibre-saturation point, the relation between drying time and average m.c. of the wood agreed well with the theoretical solutions, but the relationship was much less consistent when initial m.c. was above fibre-saturation point.

3441. NYLINDER, P. **Studier över barr-rundvirkets torkning och vattenupptagning. [Studies on drying and uptake of water in coniferous roump timber.]** *Norrlands SkogsvFörb. Tidskr.* 1950 (2), (165–230). 75 refs. [Sw.] (*Medd. SkogsforsknInst., Ser. Uppsatser* No. 15.)

The following results were obtained in a series of laboratory and field experiments: (1) For freshly-felled Pine, moisture values obtained from increment borings were higher than those from sawn discs, while the reverse was true for Spruce. (2) In Pine, moisture values showed little variation with height of the sample in the tree for up to 20% of the tree's height, but above that point values in the sapwood rose sharply; heartwood values were fairly constant at all heights. In Spruce, moisture values in sapwood sank from 0 to 10% of the tree's height, and then rose; the differences in moisture value between outer and inner sapwood and between inner sapwood and heartwood were greater than for Pine. (3) The results of laboratory tests on the progress of drying of logs in the neighbourhood of knots are shown in diagrams. (4) Barked logs at a temperature of 18°C. and relative humidity of about 75% showed a fairly rapid drop in weight during the first 20 days, and then dried more slowly. Checking occurred at 28 days. Partly barked wood dried more slowly than completely barked wood, and the portions under the bark dried very slowly indeed. (5) Seventeen Pines and 7 Spruce were cut into 1-m. lengths, half of which were barked. The timber was allowed to season from 5 May to 19 June and then floated in a log pond until the end of September. (*a*) *Drying:* Spruce dried rather faster than Pine, and the butt sections of Pine dried more slowly than the middle and top sections. The relationships between wood properties and the degree of drying was calculated using a regression analysis. Results are given in graphs showing the relative weight (expressed as a % of the weight of the green wood) after drying in relation to the proportion of the barked area, heartwood %, diameter, annual-ring breadth, latewood %, dry volume weight and green volume weight at time of felling. For Pine the relative weight after drying decreased with increasing proportion of bark removal and with increasing green volume weight, and increased with heartwood %, annual-ring breadth, latewood % and dry volume weight. Spruce showed a close correlation between

drying and the amount of bark removed, and bark thickness. (*b*) *Floating:* The uptake of water through the end surfaces of the logs for different stages during floating is shown diagrammatically. In Pine, the relative weight after floating increased in proportion to the relative weight before floating and the amount of bark removed. The relative weight decreased slightly with increasing diameter and latewood %. In Spruce, relative weight after floating increased with the relative weight after drying and with the distance of the section from the butt.

3442. KRÖLL, K. Die Bewegung der Feuchtigkeit in Nadelholz während der Trocknung bei Temperaturen um 100°. **[The movement of moisture in coniferous wood during seasoning at temperatures round 100°** [C.],] *Holz Roh- u. Werkstoff* 9 (6), 1951 (216–24). 32 refs. [G.g.] P.R.

A theoretical study of phenomena taking place during 'high-temperature' seasoning. Pore diameter is the determining factor for the movement of water vapour, i.e. for the 'flow' which is independent of diffusion. This flow seems to be mainly of a capillary nature, and the application of Thomson's equation for vapour pressure and of Hagen-Poiseuille's law, yields an equation containing the vapour-pressure gradient as the determining factor and giving the relationship between the volume of flow and the temperature, relative humidity, and cross-section of capillary lumina. If, as often happens, the channels in wood are very narrow, a correction factor is to be included in the equation. It is possible from the hygroscopic equilibrium lines for temperatures below 100° C. to obtain graphically those for temperatures above 100°. In the neighbourhood of the fibre-saturation point, the rate of tangential moisture flow in softwood depends chiefly on the water permeability of the capillaries in the cell wall. At lower moisture contents, however, the decisive factor is the permeability of the pores of the pit membranes to water vapour. An exact calculation of the movement of vapour migrating in softwood is as yet impossible, because we lack knowledge of the laws governing vapour movement in the border region between diffusion with a superimposed perceivable flow and molecular flow of the Knudsen type. *From author's summary.*

3443. RASMUSSEN, E. F., *et al.* **Properties of wood related to drying. Information on the seasoning characteristics of wood helpful in understanding kiln-drying problems.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1900–1, 1951: pp. 25 + 3 photos + 4 dgms. + 4 gphs. + 8 tbls. P.R.

Includes sections on: gross structural features; wood-moisture relations; the process of drying; specific gravity; shrinkage; electrical resistance, and colour of wood. Contains tables of the average moisture content of green wood, approximate drying periods for 1-in. lumber, sp. gr. and calculated weight of wood, shrinkage values, average electrical resistance at different moisture contents, and accepted common names, for some 80 American woods.

3444. REHMAN, M. A. **The seasoning behaviour of Indian timbers. Part 1.** *Indian For.* 78 (2), 1952 (81–5).

Describes the seasoning behaviour of *Abies pindrow*, presents a schedule for its kiln-drying, and gives a list of other Indian species to which the schedule is applicable.

3445. HORVAT, I., and EMROVIĆ, B. Režimi sušenja drveta. **[Wood seasoning schedules.]** *Šum. List* 75 (8/10), 1951 (303–21). [Croat.croat.e.]

A general account containing the following kiln-drying schedules in tabular form: (1) Madison, (2) H. L. Henderson's for American hardwoods and softwoods, (3) Soviet (VIAM schedules for timber used in aircraft industry, and CNIIMOD schedules for Birch and Beech). A table lists the suitable schedules from among (1)–(3) for 12 Jugoslav species, as used in Jugoslav sawmills.

3446. MACLEAN, H., and GARDNER, J. A. F. **Deterioration of wooden dry kilns used for drying Western Hemlock lumber.** *Lumberman* 78 (12), 1951 (88, 90).

The Vancouver Laboratory of the Canadian Forest Products Laboratories has undertaken an investigation on the causes and control of deterioration in wooden kilns drying Western Hemlock. The kiln examined was about 6 years old, with walls of solid 6 × 6-in. Western Red Cedar and roofboards of 2 × 6-in. Douglas Fir. The wood was badly deteriorated, black in colour and similar in structure to advanced cubical brown rot, especially round metal fittings and nails, and the metal was corroded. The Douglas Fir was more seriously damaged than the Western Red Cedar. An apparatus was made to condense the vapours issuing from the roof vents of the kiln, and samples of condensate were collected during the drying of Western Hemlock and Douglas Fir. The pH of the condensate by the 4th day of a kiln run was 3·54 for Western Hemlock and 4·00 for Douglas Fir. Tests on a deteriorated roofboard showed a lignin content of 61%, against 29% in sound wood. This result indicates how acid hydrolysis of the cellulose component has left a residue very rich in lignin. To confirm the conclusion that acidic conditions are responsible for the corrosion, a sample of the roofboard, cleaned down to the sound wood, along with a piece of copper and of iron wire, was exposed to an atmosphere composed of the hot vapours of a boiling mixture of dilute acetic, formic and carbonic acids (the acids identified in the condensate) at an acid concentration of pH 3·10. At the end of 3 weeks the iron wire had corroded away, the copper wire had parted where condensate had dripped on it, and the wood had darkened and showed cubical checking. It is believed that the high resin content is mainly responsible for the lack of damage during the seasoning of Douglas Fir; during a run some of the resin is distilled on to walls, pipes etc., forming a protective layer. To prevent damage, the provision of a vapour barrier of asphalt or aluminium inside the kiln walls is suggested. Kilns of concrete-block construction should be examined periodically to ensure that the asphaltic protective coating is intact,

as concrete may deteriorate slowly in the presence of dilute acids.

3447. Ellwood, E. L., Lansell, C. V., and Gottstein, J. W. **Project S7. Special seasoning processes. Sub-project S7–12. Vapour drying. Progress report S7–12/1. The development and testing of a small vapour drying experimental unit.** (First report.) Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, Melbourne. 1951. pp. 18 + 9 photos + 1 dgm. + 4 gphs. P.R.

Experimental drying under a simple standard schedule showed that the relatively permeable species which are not susceptible to collapse, dried rapidly and relatively free from degrade. Species which tended to collapse or were less permeable showed severe degrade.

3448. Brezinšćak, M. Visokofrekventno sušenje i zagrijavanje drveta. [**The R.F. seasoning and heating of wood.**] *Šum. List* 75 (8/10), 1951 (277–86). 11 refs. [Croat.croat.g.]

A technological and economic analysis of the use of R.F. for timber seasoning and for glue setting. Several Russian papers published in an electrical engineering journal are quoted from.

85. GRADING OF WOOD AND WOOD PRODUCTS

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 2719, 3054, 3296, 3356–7, 3411–2.

3449. Perkitny, T., Wojciechowski, E., and Wnuk, M. Pękanie surowca bukowego. Analiza przyczyn i sposobów zapobiegania. [**Shakes in Beech logs. Analysis of causes and of means of prevention.**] *Prace Inst. Bad. Leśn.* No. 68, 1951. pp. 51 + 2 tbls. 2 refs. [Pol.russ.]

The authors consider that, contrary to generally accepted opinion, the contraction of wood tissue owing to loss of water, is, in general, not the cause of shakes in Beech logs. They show theoretically that tensile strains can appear in fibres near the circumference of living trees. By means of rings 3 mm. wide and 3 cm. deep, cut out of the periphery of freshly felled logs (illustrated), they demonstrate the existence of these tensile strains and their connexion with shakes. They recommend and discuss the following counter-shake measures: (1) cutting the trees close to the ground, and into the longest possible, preferably tree-length, logs, and cutting off the buttress and forked top end immediately before sawing up; (2) storage in water, to prevent desorption-type shakes. The possibilities of clamps, hooks, and circular incisions will be the subject of special investigation.

853. *Grading of Logs*

3450. Lockard, C. R. **Hardwood log grading—a phase of quality control.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1951 (61–9). P.R.

The essential requirements of a realistic system of log grading are outlined, and a system of hardwood log grades is discussed in some detail.

854. *Grading of Converted Timber*

See also Nos. 3379–80, 3383, 3389.

3451. **Definitions for cant and flitch.** *Timberman* 53 (2), 1951 (126).

3452. Cooper, K. L. **Project T.M.9–0. Progress report No. 2. Preferred stress grades.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, Melbourne. 1951. pp. 8. 6 refs. P.R.

A geometric series of universal stress grades for timber is suggested, both in metric and British units, and the properties and application of this series are discussed.

86. PULP INDUSTRIES. CHEMICAL UTILIZATION OF WOOD

861. *Paper and Cardboard Industry (Pulp, Paper, Cardboard, Fibreboards)*

See also Nos. 3025, 3226, 3248, 3429.

Pulping and Pulp

3453. Jayme, G. **On the pulp and paper industry of Australia.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1030, 1950. pp. 25. Transl. by M. Slade from *Papier* 3 (11/12), 1949 (201–16). [Cf. *For. Abstr.* 11 (No. 2990).] P.R.

3454. Hess, R. W. **Pulpwood from tropical forests.** *Unasylva* 5 (3), 1951 (102–6).

Conference paper dealing with the subject on general lines.

3455. Seabra, L. de. Estudos de tecnologia. Contribuições para o estudo tecnológico das espécies da flora colonial. [**Technological studies. Contributions to the technology of colonial species.**] *Anais, Junta de Investigações Coloniais, Lisboa* 3 (6), 1948. pp. 107 + 19 plates. 33 refs. [Port.]

The report is presented in 4 parts: (1) Plan for the organization of anatomical and technical studies of colonial timbers, with an outline of the organization and projects of the laboratories of the Junta de Investigações Coloniais for studies of the anatomy and technology of colonial timbers, including wood chemistry, pulping and preservation. (2) The value of some Mozambique species in the cellulose industry, including the results of chemical analyses and pulping tests of *Oxytenanthera abyssinica*, *Phragmites communis*, *Hyphaene crinita*, *Hibiscus tiliaceus* and *Barringtonia racemosa*. The pulps of the latter two species had poor strength qualities and resisted bleaching. The most promising species were *O. abyssinica* and *H. crinita*. (3) The use of a rapid-growing leguminous species in the pulping industry: a study of *Albizzia montana*, its anatomy, chemical properties and suitability for pulping. Pulp yields were high, but difficulties of bleaching and of obtaining a smooth texture result in a pulp only suitable for wrapping papers. (4) The use of the bark and wood of *Adansonia digitata* for pulping. Average yield, and a pulp suitable for wrapping paper, were obtained from the inner bark. A strong pulp was produced from the wood. Unbleached, it was suitable for wrapping papers, and, bleached, it made a good-quality writing paper.

3456. SEABRA, L. DE. Considerações acerca da contribuição das espécies coloniais para a indústria da pasta para papel. **[The contribution of colonial species to the pulping industry.]** Ministério das Colónias, Junta de Investigações Coloniais, Lisbon 1949. pp. 23 + 6 plates. [Port.f.e.]

Discusses the situation in Portugal with regard to pulp supply, and the possibility of augmenting supplies from colonial sources, reviews the nature of cellulose fibres, and presents the results of laboratory tests of a number of African species (including palms and Gramineae) with notes on their possible exploitation.

3457. BHAT, R. V., and SINGH, M. M. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part V. Pulps for strawboards from *ulla* grass (*Themeda arundinacea*) and *panni* grass (*Vetiveria zizanioides*).** *Indian For.* 78 (1), 1952 (2–6). 8 refs.

Pulps suitable for strawboards can be prepared from these grasses by digestion with CaO. Since these grasses are burnt every year to prevent forest fires, they should be available at a cheap rate. [Cf. *For. Abstr.* 13 (No. 2594).]

3458. BHAT, R. V., and GUHA, S. R. D. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part VI. Writing and printing papers from Paper Mulberry (*Broussonetia papyrifera*).** *Indian For.* 78 (2), 1952 (93–9 + 2 specimen pages). 3 refs. [Forest Research Institute, Dehra Dun.]

Easy-bleaching pulps in good yields and with satisfactory strength properties were obtained from the wood of *B. papyrifera* by the sulphate process. Since these pulps are short-fibred, an addition of about 25% of long-fibred pulps, as from Bamboo, is necessary. [Cf. *For. Abstr.* 12 (No. 2168); 13 (No. 2594).]

3459. HAGGLUND, S.-E. **High-yield pulps from hardwoods using conventional cooking methods and multistage bleaching.** *Tappi* 34 (12), 1951 (545–7). P.R.

By using conventional methods of cooking, a number of semi-lignified pulps were prepared from different species of hardwood (mostly Birch, but also Beech, Aspen, Oak, Maple, Alder, and Eucalypt). These pulps were bleached to a high brightness, using a multi-stage procedure. Both the bleached and unbleached pulps had remarkably high strength properties. The effect of cooking and bleaching variables was investigated, and the properties of the end product compared with neutral sulphite semi-chemical pulp.

3460. SCHAFER, E. R., and HYTTINEN, A. **The groundwood pulping of mixtures of White Spruce and Quaking Aspen.** *Tappi* 33 (7), 1950 (335–7). P.R.

As the amount of Aspen in the mixture increased, the motor load remained constant but the grinding rate increased, energy consumption decreased, freeness increased, and strength decreased, the relationships being nearly linear.

3461. KLEM, G. G. **Granvirke som råstoff för massaindustrien. [Spruce as raw material for the pulp industry.]** *Svenska SkogsvFören. Tidskr.* 49 (4), 1951 (329–41). [Nor.]

Discusses the relationship of specific gravity, chemical composition, annual ring breadth, length and thickness of fibres, and thickness of the fibre wall, the proportion of spring and summer wood, and the presence of knots, reaction wood, and decayed wood, to pulp yield and quality. Recent research by the Norske Forsøksvesen shows that breadth of annual rings is not a good criterion of pulping quality because it gives no reliable indication of the proportion of knots in wood from different site classes. Stem form is considered to be the best criterion: there is a good correlation between stem form and the number of knots, and a less good correlation, especially on poorer site classes, between stem form and sp. gr. It is hoped to evolve a system based on taper which would be of practical use in determining pulping quality. A comparison of paper produced in the N.E. and Central, Southern, and N.W. States of the U.S.A. with that of Norway, and of the species used, indicates that Black Spruce is nearest in structure and paper-making quality to *Picea abies* from Scandinavia. Norwegian and Danish research on *P. abies* of German and of Scandinavian provenance indicates that the German Spruce shows the highest sp. gr. for the same annual ring breadth and site class. It also showed a sharper distinction between spring and summer wood and a relatively high % of summer wood. Yield and quality of pulp were roughly the same, but there was a greater variation from the average in German than in Norwegian Spruce. It is hoped to published more detailed results soon. Conclusions drawn are that normal encouragement of dense regeneration, followed by thinnings to leave an even distribution of trees over the stand area, will yield wood of good pulping quality.

3462. LEWIS, H. F. **Redwood as a potential source of pulp.** *Tappi* 34 (9), 1951 (385–90). P.R.

Substantial quantities of *Sequoia sempervirens* are available for conversion to pulp [in the Pacific sector]; these include the non-merchantable lumber from the mill, logging wastes in the woods, and second-growth thinnings. Old-growth Redwood has a relatively low density and high content of extractives and lignin; conventional chemical pulping processes, therefore, are not attractive economically. Because of its fibre characteristics, such wood makes a desirable raw material for conversion by the Asplund process into roofing or flooring felt. Second-growth Redwood is more attractive for conversion by the sulphate process into unbleached and bleached pulps of good quality. *From author's summary.*

3463. GLENNIE, D. W., and SCHWARTZ, H. **Review of the literature on decay in pulpwood, its measurement and its effect on wood properties and pulp quality.** *Mimeo. For. Prod. Lab., Can.* No. *O*–153, 1950. pp. 22. 67 refs. P.R.

Includes sections on chemical studies of decayed wood (classification of fungi, hydrolytic and oxidative action and other effects of white and brown rots, products of wood decay), physical studies on decayed wood, effect of decay in pulpwood on the

yield and quality of pulp (groundwood, sulphite, soda, and sulphate pulp), and effects of sap-staining fungi on pulp yields and quality. The literature references cover the period 1917–49. [Cf. *For. Abstr.* 13 (No. 3429).]

3464. McGovern, J. N. **Pulping of Lodgepole Pine.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1792, 1951. pp. 11 + 5 tbls. 5 refs. P.R.

Presents the results of physical and chemical tests on the groundwood, sulphite, and sulphate pulps made from both green-cut and insect-killed *Pinus contorta*. The dead wood did not differ appreciably in chemical composition from the green wood. The green and the sound dead wood showed similar pulping characteristics, pulp yields, and pulp strengths. The dead wood with decay showed a slight tendency to pulp more rapidly and to give lower yields and strengths. The differences were of the order of 5–10%.

3465. West, P. H. **Barking and chipping 8-foot pulpwood.** *Paper Tr. J.* 134 (3), 1952 (20 . . . 26). P.R.

An illustrated description of a new wood room built in 1950 (for the pulp mill of Thilmany Pulp and Paper Co.), containing: hot pond, barking drum, chipper, chip screens, re-chipper, conveyors.

3466. Keller, E. L. **Effect of bark in the neutral sulphite semichemical pulping of Aspen, Hickory, and Slash Pine.** *Tappi* 33 (11), 1950 (556–60). 12 refs. P.R.

Gives pulp yields from the three barks, and the Na_2SO_3 consumption, the former being less and the latter greater than for wood fibre. In mixed bark and wood pulping, as the proportion of bark increased, the strength and density of standard test sheets decreased, Aspen pulps being most and Hickory least sensitive to the addition of bark

Paper

3467. Klauditz, W. Beiträge zur chemischen und physikalischen Technologie des Holzes und der Holzfaserstoffe. Zur Kenntnis der grundlegenden Vorgänge der Papierbildung aus Holz. [**Contributions to chemical and physical technology of wood and its fibrous materials. Fundamental processes in the formation of paper from wood.**] *Holzforschung, Berlin* 5 (3), 1951 (58–67). 20 refs. [G.g.e.] P.R.

An extract from an unpublished lecture delivered by the author in 1943. The 'felting' theory of paper formation is reviewed and criticized. Results of an investigation are presented in which paper was obtained from Aspen veneer 0·7 mm. thick, precautions being taken not to disturb the parallel arrangement of the individual fibres during sulphate cooking, $NaClO_2$ treatment, and drying of the 'pulp' layer. When compared with paper manufactured from the same material, with and without mechanical comminution after cooking, the following figures were obtained for tensile strength: (1) Aspen wood 706, (2) 'veneer paper': air-dried 1470, dried on a sheet-drier 2750, first wet-compressed and then dried on a sheet-drier 4760, (3) paper unground: air-dried 23, sheet-dried 417, wet-compressed and dried 839, (4) ground paper: air-dried 508, sheet-dried 1065, wet-compressed and sheet-dried 1205 kg./sq. cm. Photo-micrographs and results of a chemical investigation of uncooked and cooked Aspen veneers are given. It is suggested that it is the polyuronides ('pecto-polyuronides') of the hemicellulose, probably localized in the middle lamellae and in the primary cell wall, and not lignin, that are mainly responsible for the bonding of wood cells. These polyuronides are present in the cooked pulp, although in reduced proportion, and it is claimed that they effect the bonding of paper fibres. Thus 'bonding' is the main cause of paper formation, and the 'felting' theory is unfounded. [Cf. *For. Abstr.* 13 (No. 3475).]

Fibreboards

See also Nos. 3315, 3396, 3457.

3468. Kloot, N. H., and Walker, V. Y. **Project T.M.26. The mechanical properties of fibre building boards. Sub-project T.M.26–0. Miscellaneous tests. Progress report No. 4. The effect of soaking on some properties of fibreboards.** Division of Forest Products, C.S.I.R.O., Melbourne, Australia. 1951. pp. 11 + 6 gphs. 3 refs. P.R.

The effect of soaking in water on the bending properties and puncture resistance of a hardboard and an insulating board has been examined. It has been observed that the relationship between the bending properties and soaking period up to 24 hr. is, for practical purposes, sufficiently close to exponential. It is considered that the choice of a 24-hr. soaking period for tests on fibreboards is therefore a suitable one, and estimates can, if necessary, be made of the effects of soaking for a shorter period. Soaking appeared to have different effects on the puncture resistances of the two types of board and until further data are available, the choice of a suitable soaking period for puncture-test specimens remains an arbitrary one. *Authors' summary.*

3469. Kitahara, K. **Effects of the radius of loading point and support on the bending properties of hardened fiberboard.** *Misc. Inform. Tokyo Univ. For.* No. 8, 1951 (105–12). [Jap.e.]

Discusses the dependence of the measured values of Young's modulus and the modulus of rupture of hardboards upon the radii of both the load and support points, and gives corrected formulae to be used when calculating the true span and deflection from the values observed when the bending properties of boards are tested by applying different radii of supports.

3470. DePan, R. T. **Small plant set-up for insulation and hardboard manufacture.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (279–88). P.R.

General account of the various processes of manufacture, with illustrations and flow diagrams for the lay-out of a small plant.

3471. Gottstein, J. W. **Some studies of sawdust-synthetic resin combinations for hardboard manufacture.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (310–21). P.R.

Describes a laboratory experimental technique for manufacturing small-test specimens of boards from

untreated sawdust and dry synthetic-resin powders. Presents the results of exploratory tests on the effect of various factors upon the quality of the product. The tests included microscopic examination with reference to associated physical properties.

3472. EVANS, H. R. **Hardboards from wood semi-dry process.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (268–70). P.R.

Describes a semi-dry process of the Plywood Research Foundation, Tacoma, Wash., for the production of hardboards from bark-free veneer waste, edgings, slabs, and other waste or residue. Small amounts of thermo-setting phenol-formaldehyde resins are added to the chips during the continuous-steaming softening process, followed by defibrating. Boards obtained by this process have properties similar to those made by commercial wet- and dry-felting processes.

3473. FARBER, E. **Hardboard from hardwood.** *Proc. U.S. For. Prod. Res. Soc.* 4, 1950 (271–8). P.R.

Describes a new process of producing hardboard of medium density and hardness. Pulp of a specified degree of fibre hydration is obtained by a chemo-mechanical process. The boards are effective as a face material for wirebound boxes.

3474. ANDERSON, A. B., and RUNCKEL, W. J. **Utilization of barks in hardboard.** *Paper Tr. J.* 134 (4), 1952 (22 . . . 30). 3 refs. P.R.

It has been found that Douglas Fir bark mixed with wood in varying proportions is a suitable raw material for the manufacture of hardboard. Preliminary tests also indicate that Western Hemlock bark can be used for the same purpose. The quantity of bark may vary from 20 to over 45% without unfavourably affecting the quality of the product.

3475. KLAUDITZ, W., and STEGMANN, G. Über die grundlegenden chemischen und physikalischen Vorgänge bei der Wärmevergütung von Holzfaserplatten. **[Fundamental chemical and physical processes in the heat treatment of wood-fibre boards.]** *Holzforschung, Berlin* 5 (3), 1951 (68–74). 12 refs. [G.g.e.] P.R.

Presents the results of an investigation in which various mechanical properties and the chemical composition of Poplar (*P. marilandica*) fibreboards, before and after heat treatment, were determined. It was found that heat treatment (2 hours at 160° C.) caused a decrease in weight of 0·81%, the gaseous substances lost being H_2O (0·67%), CO_2 (0·10%), and acetic acid (0·04%). The loss of CO_2 is attributed to a partial thermal decomposition of carboxyl groups, resulting in a reduction of hydratable groups in wood, and this accounts for the much improved hygroscopic properties of the heat-treated wood compared with that not treated. The increase of 15–30% in the tensile and bending strength, due to heat treatment, is apparently not due to increase in the strength of the fibres themselves because heat treatment, as conducive to the reduction of the degree of cellulose polymerization, would rather cause a reduction of strength. As, moreover, it was found that fibreboards made of lignin-free material display the same increase due to heat treatment as those made of a non-delignified material, it is concluded that lignin does not play any significant role in the strength increase. The heat-treated boards were found to be built from shorter fibres and to contain cellulose of a lower degree of polymerization than the untreated ones. Thus it seems that the higher strength values of heat-treated boards can only be due to the bonding effect of the polyuronide portions of the hemicellulose. [Cf. *For. Abstr.* 13 (No. 3467).]

865. *Plastics*

See also Nos. 3025, 3396.

3476. KEILEN, J. J., DOUGHERTY, W. K., and COOK, W. R. **Lignin-reinforced nitrile, neoprene, and natural rubbers.** *Industr. Engng. Chem.* 44 (1), 1952 (163–7). 6 refs. P.R.

The combination of properties obtainable when lignin is co-precipitated with natural, nitrile, or neoprene rubbers, as well as with GR-S, is novel. The tensile strength obtained is at least as good as in the case of carbon black, and a good abrasion resistance and tear resistance are achieved. High elongation and low modulus are combined with high tensile strength and high hardness. Although itself dark, lignin has low tinting power.

866. *Utilization of Wood Extractives*

See also No. 3293.

3477. SADGOPAL and VARMA, B. S. **Agar oil from the wood of *Aquilaria agallocha* Roxb.** *Indian For.* 78 (1), 1952 (26–33 + 5 photos). 9 refs.

A simple and economic method of distilling the essential oil of agar from infected wood of *A. agallocha* is described. The article also summarizes the state of knowledge on the factors responsible for attack of sound wood by fungus and consequent formation of the agar oleoresin.

867. *Destructive Distillation*

See also Nos. 3025, 3398.

3478. KISHIMOTO, S. **The determination of charcoal quality from its electrical resistance.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (7–10). 15 refs. [Jap.e.]

A test piece of *Quercus serrata* was carbonized, and the specific resistance of the charcoal measured with an electric potentiometer, and the contact resistance by a specially designed electric resistance meter The two curves obtained were similar and had a parallel relationship. *From author's summary.*

3479. BALDWIN, H. I. **Charcoal production in steel drums.** *Repr.* from *Bull. Ntheast. Wood Utiliz. Coun.* No. 37, 1952. pp. 8. 9 refs.

Discusses equipment, methods and costs. [Cf. *For. Abstr.* 11 (No. 3107).]

89. OTHER ('MINOR') FOREST PRODUCTS

892. *Vegetable Products*

892.3. Wood Ashes

3480. PORTÈRES, R. **Enquête sur l'origine des cendres végétales utilisées en Guinée française**

forestière. **[The origin of plant ash used in the forest regions of French Guinea.]** *Comptes rendus, première Conférence internationale des Africanistes de l'Ouest, Paris* Vol. 2, 1951 (60–70). [F.] Published by the Librairie d'Amérique et d'Orient Adrien-Maisonneuve, 11 rue Saint-Sulpice, Paris 6e. Sponsored by the Institut Français d'Afrique Noire, Dakar. L.S.

A list of species with brief notes on the uses made of the ash of leaves and/or branches and stem.

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 3466, 3474.

3481. ROGERS, J. S. **Native sources of tanning materials.** *Yearb. Agric. U.S. Dep. Agric. 1950/1951* [1951] (709–15). O.R.E.

Notes on *Rumex hymenosepalus, Rhus* spp., *Quercus laevis, Tsuga heterophylla, Pseudotsuga taxifolia* and *Castanea dentata.*

3482. GELIFGAT, M. Z. Optimaljnye uslovija primenenija elovogo ekstrakta. **[Optimum conditions for the use of Spruce extract.]** *Legkaja Promyslennostj, Moskva* 11 (4), 1951 (32–3). [Russ.] L.S.

While no more than 30–40% of Spruce tannins can be used during the purely vegetable tanning of hides, these tannins can be used without any admixture in the case of a two-phase chrome/vegetable tanning. Industrial-scale tests have shown that a compound of 80% of Spruce tannins and 20% of non-vegetable tannins ('Syntan AN' and sulphite-cellulose extract) gives a well tanned, light-coloured leather.

3483. ROGERS, J. S., CALDERWOOD, H. N., and BEEBE, C. W. **Study of the tannin content of barks from the Florida Scrub Oaks *Quercus laevis* and *Quercus cinerea*.** *Journal of the American Leather Chemists' Association, Easton, Pa.* 45 (11), 1950 (733–51). 28 refs. B.L.M.R.A.

Study of age and size of *Q. laevis* indicated that in this species most rapid growth occurs during the first 30 years. Study of barks from tree trunks from 6 plots of *Q. laevis* showed (on a moisture-free basis) an average tannin content of 10·5% and a purity of 58·8, as compared with an average of 6·7% tannin and a purity of 56·0 for barks from one plot of *Q. cinerea*. Analysis of barks collected at 4 heights on one tree trunk on each of 6 plots indicated that tannin content decreased from butt to top of trunk, but this was not confirmed by later tests, in which barks from lower and upper halves of trunks were compared. No correlation was found between tannin contents of barks and ages or diameters of trees for either species. *Q. cinerea* frequently accompanies *Q. laevis* in Florida, usually composing less than 10% of the stands. Average stands of *Q. laevis* could yield ca. 1 ton of 25% tannin extract per acre. *From authors' summary.*

3484. INAL, S. **Die Valoneneiche (*Quercus aegilops*), ihre Nutzung und wirtschaftliche Bedeutung. [*Q. aegilops*, its use and economic importance.]** *Z. Weltforstw.* 14 (6), 1951 (187–90). [G.e.f.]

An account of its distribution and cultivation in Turkey, giving figures for yield and export value. **[Cf. *For. Abstr.* 12 (No. 2228).]**

3485. **[Tannin content of bark of *Acacia monili-formis*].** *Rep. For. Res. W. Bengal 1949/50*, 1951 (16).

Bark from 3-year-old trees contained 1·02%, and from 20-year-old trees 0·68% tannin on a dry basis.

3486. BHANDARI, P. R., DHAR, M. L., and SHARMA, V. N. **Chemical constituents of the root bark of *Crataeva nurvala* Ham.** *J. sci. industr. Res., India* 10*B* (8), 1951 (195–6). 1 ref. D.S.I.R.

Lupeol, β-sitosterol, varunol, and an unidentified crystalline substance have been found in extracts of the root bark.

3487. KURTH, E. F., and CHAN, F. L. **Dihydroquercetin as an antioxidant.** *Repr.* from *Journal of the American Oil Chemists' Society, Chicago* 28 (10), 1951 (433–6). 14 refs.

Dihydroquercetin, a white crystalline pentahydroxyflavanone occurring in large quantities in Douglas Fir and Jeffrey Pine barks, was found to be an effective anti-oxidant for lard, cottonseed oil, and butter oil. The compound imparts no taste and colour to fats and oils and, like quercetin, appears to be non-toxic. Its anti-oxidant effect on lard is markedly increased by the presence of a small amount of citric acid. *From authors' summary.*

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants etc.

See also No. 3504.

3488. DAGLISH, C. **The occurrence of ascorbic acid in the Walnut (*Juglans regia*).** *Biochem. J.* 49 (5), 1951 (639–42). 7 refs. [Ovaltine Research Laboratories, King's Langley, Herts.] O.R.S.

Spectrophotometric assays were applied to extracts prepared from ♂ catkins, vegetative buds, mesophyll, midribs and stalks, stems and fruits, collected between May and October. Results, which show considerable seasonal variation in the concentration and amount per unit of ascorbic acid and dehydroascorbic acid, are given in graphs.

3489. NARASIMHA RAO, P. L., and VERMA, S. C. L. **The antibiotic principles of *Garcinia morella*: I—preparation and antibacterial activity of morellin, morellin-T, morellin-M, morellin-L and *iso*-morellin.** *J. sci. industr. Res., India* 10*B* (8), 1951 (184–5). 8 refs. D.S.I.R.

Morellin, a pigment from the seeds of *G. morella*, and fractions of morellin, obtained by chromatographic separation, were tested for their antibacterial properties on several species of pathogenic micro-organisms, with varying results.

3490. CERCÓS, A. P. Actividad antimicrobiana de la vinalina, alcaloide del vinal (*Prosopis ruscifolia* Griseb.). **[Antibacterial activity of vinalin, alkaloid of *P. ruscifolia*.]** *Rev. argent. Agron.* 18 (4), 1951 (200–9). 12 refs. [Span.e.] E.M.B.

The alkaloid obtained from infusions of the leaves had a pronounced antibiotic effect on Gram-positive bacteria, but was much less effective on Gram-negative bacteria. Growth of some fungi is also inhibited by greater doses than those used against the bacteria. In the form of intravenous and subcutaneous injections vinalin is also toxic to rats and rabbits.

3491. BARNARD, C. **The Duboisias of Australia.** *Econ. Bot.* 6 (1), 1952 (3–17). 74 refs.

A review of botanical and pharmacological literature on the Australian *Duboisia* spp. The leaves of *D. leichhardtii* are being increasingly used as a source of atropine and hyoscine.

3492. **Fifty forest species yielding supplementary food.** Ministry of Agriculture, Government of India, New Delhi. 1951. pp. 57.

Includes some herbs, water plants and fungi.

3493. IRVINE, F. R. **Supplementary and emergency food plants of West Africa.** *Econ. Bot.* 6 (1), 1952 (23–40).

Brief notes on a large number of wild plants which supply edible products.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums: Latex. Dyestuffs. Sap Sugar

See also Nos. 3013–7, 3408.

3494. CHENOPOULOS, D. Hē rētinē kai ta rētinika mas proïonta. [**Resin and our resin products.**] *Dasos* No. 8/9, 1949 (29–38). [Gk.]

An account, in some detail, of the resin industry in Greece, both before and after World War II, with recommendations for improvement in tapping operations, apparatus, and marketing. The chief species tapped are *Pinus halepensis* and its variety *brutia*, and, on a much smaller scale, *P. nigra*. Before the war, 15,000 people were employed in tapping and collection on contract leases, producing ca. 22 million okes (1 oke = 2·8 lb.), half of which came from an area of 3 million acres. Most of this was ruined during the war, so that production reached only 6,500,000 okes in 1947 and 5,700,000 in 1948. About 10,000 people are employed. By law of 21 Feb. 1939, only one (conservative) system of tapping is now allowed, with a tapping season from 1 April to 31 December and setting-up from 15 February. Faces 10–14 cm. broad are recommended, according to tree diameter (minimum diam. 25 cm.), with weekly freshenings, shortened to 3–4 days for high yielders. Well-shaped, higher-diameter trees can give 3 okes of resin p.a., *P. halepensis* being considered the best producer.

The author recommends that resin tapping be developed in such areas as Samos, Mytilene, Thases and Crete.

3495. ŠOLAJA, B. Fizičke i hemijske osobine terpentinskog ulja borova *Pinus nigra* Arn. i *Pinus silvestris* L. sa Ličkog krša. [**Physical and chemical properties of *P. nigra* and *P. sylvestris* turpentine from the Lika [Jugoslav] Karst.**] *Glasn. šum. Fak., Beograd* 2, 1951 (1–43). 34 refs. [Serb.f.]

Presents the results of comprehensive investigations of physical and chemical properties of turpentine obtained from both species (both from oleoresin produced by tapping trees and from resin scrape). The work was carried out in 1930–32 but, for various reasons, could only now be published. The oleoresin from which turpentine oil was obtained by steam distillation was taken from 112 trees of both species, using both the French and the American-German method of tapping, as well as the Jugoslav (Ugrenović) method, and, finally, the bore-hole (drilling) method, this latter in order to obtain fresh, unaltered primary oleoresin. The physical properties (specific rotation of the turpentine and that of the α-pinene fraction, the irregularities in sp. gr. and in the refractive index) indicate that the trees tapped belonged to subspecies or varieties of the two species in question. The differences between the varieties are more pronounced in *P. sylvestris* than in *P. nigra*. The American-German method of tapping yields a turpentine with a stronger laevorotation than the French method, and the properties of the oil obtained by the former are less scattered round the mean. North faces in *P. nigra* give a turpentine having a larger rotation than that from south faces. The oil obtained from various specimens of *P. sylvestris* oleoresin shows great differences in specific rotation (from dextro- to laevorotation), attaining sometimes 40°. Turpentine from the Jugoslav *P. sylvestris* contains ca. 80% α-pinene fraction and ca. 16% nopinene; data relating to *P. nigra* have been lost, but it is certain that the α-pinene fraction from *P. nigra* consists almost entirely of *l*-α-pinene.

3496. IVANOFF, D., and IVANOFF, C. Analyse de l'essence de térébenthine du *P. nigricans*, de l'essence de bois et des colophanes d'origine bulgare. [**An analysis of oil of turpentine from *Pinus nigra* var. *austriaca*—turpentine and rosin of Bulgarian origin.**] *C.R. Acad. bulg. Sci.* (*Sci. math. nat.*) 3 (1), 1950 (17–20). 2 refs. [F.russ.] C.G.B.

3497. INOUYE, Y., and MITANI, S. **Studies on the vacuum distillation of turpentine with active carbon and sulphur.** *Wood Res., Kyoto* No. 6, 1951 (1–6). 12 refs. [Jap.e.] X.

Sulphur was found to be more than twice as effective as carbon. The turpentine obtained from *Pinus thunbergii* resin was found to contain 45·89% of abietic acid.

3498. VELHO, A. Resina de mubafo. [**Resin of *Canarium schweinfurthii*.**] *Agron. angol.* No. 5, 1951 (203–4). [Port.]

Short notes on the properties of the resin and resin oil of *Canarium schweinfurthii*.

3499. MURRAY, J., and STANLEY, B. G. **The essential oil of *Nothopanax simplex*.** *J. appl. Chem.* 2 (1), 1952 (5–7). 12 refs. P.R.

The essential oil of *N. simplex* consists largely of myrcene, with smaller amounts of other terpenes and sesquiterpenes, and paraffin wax.

3500. SARDINHA, A. MANUEL. Ensaios tecnológicos sobre a extração de óleos essênciais de algumas espécies do género *Eucãlyptus*. [**Technical studies of the extraction of the essential oils from some *Eucalyptus* spp.**] *Agros* 34 (6), 1951 (263–8). [Port.] A.P.B.

Contains data on the density and yield of oil from different species.

3501. HILLIS, W. E. **The chemistry of Eucalypt kinos. I. Chromatographic resolution.** *Aust. J. appl. Sci.* 2 (3), 1951 (385–95 + 8 photos). 32 refs. P.R.

Gives details of the technique used and the results obtained in an examination of free kinos, in the liquid state from *Eucalyptus corymbosa*, *E. obliqua*, *E. radiata*, and *E. regnans*, and in the solid state from *E. calophylla* and *E. sideroxylon*.

3502. Mirov, N. T. ***Simmondsia* or Jojoba—a problem in economic botany.** *Econ. Bot.* 6 (1), 1952 (41–7). 12 refs.

Reports results of various analyses of the liquid wax derived from seeds of *Simmondsia chinensis*, and discusses its possible exploitation and the results of attempts to grow *S. chinensis* in plantations.

3503. Benk, E. Über Birkensaft. [**Birch sap.**] *Seifen-Öle-Fette-Wachse*, *Augsburg* 77 (14), 1951 (337–8). [G.] L.S.

General information, chemical composition, and utilization.

892.7. Fruits, Seeds. Fibres, Yarns and Flosses

See also Nos. 3006, 3012, 3457.

3504. Rao, P. S. **Non-cereal foods: Tamarind seed kernels as food and fodder.** *Indian For.* 78 (1), 1952 (36–8). 9 refs.

A powder derived from the seed kernels is a substitute for starch. Experiments in feeding it to bullocks indicate that it could profitably form up to ⅓ of their daily fodder.

3505. Remussi, C. Las plantas textiles en la Argentina. [**Textile-producing plants in Argentina.**] *Rev. argent. Agron.* 18 (3), 1951 (154–70). 14 refs. [Span.] E.M.B.

Includes brief notes on the palm *Trithrinax campestris* and its importance in the Argentine textile industry.

892.8. Heather, Broom, etc. Osiers. Canes and Bamboos

See No. 3327.

893. *Animal Products*

See Nos. 2761, 3018.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

See also Nos. 2711–4.

901. *Theory etc., Peculiarities of Forestry from the Point of View of Social Economics*

3506. MACGREGOR, J. J. **The political economy of British forestry. With discussion.** *Journal of Proceedings of the Agricultural Economics Society, Reading* 9 (4), 1952 (287–307). 3 refs. O.A.Ec.

Cf. *For. Abstr.* 13 (No. 3510).

902. *History of Forests and Forestry*

See also No. 3523.

3507. STEBBING, E. P. **A century of forestry. Forestry in the British Commonwealth in the last century.** *Nature* 169 (4292), 1952 (173–7).

3508. BERESFORD-PEIRSE, SIR H. **A century of forestry: forestry in the United Kingdom over the last century.** *Nature, Lond.* 169 (4291), 1952 (130–4).

The substance of an address to Section K* (Forestry) at the British Association meeting at Edinburgh in 1951.

3509. KUTLUK, H. [Editor]. Türkiye Ormancılığı ile ilğili Tarihî Vesikalar, [A.D.] 1487–1923. **[Historical documents relating to Turkish forestry, 1487–1923.]** *Tar. Bak. Orm. Gen. Müd. Yay.* No. 56, 1948 (1–685). 253 refs. [Turk.] X.

The material, much of which relates to edicts and legislative enactments, is classified under a great number of heads and subheads, including: forest protection and policing; insects and their control; grazing; land settlement; hunting; precautions against illicit cutting and export; reclamation of Olive groves; penal provisions; forest ownership; forest demarcation and inventory; forest use and ownership categories; management provisions; afforestation; taxation; permits, leases, transit regulations; timber and fuel; staff organization; forestry education, propaganda and publications. [Cf. *For. Abstr.* 13 (Nos. 2713, 2812, 3511).]

903. *Forest Policy, General*

3510. MACGREGOR, J. J. **The problems of British forest policy.** *Westminster Bank Review, London* Feb., 1952 (4–10). X.

Cf. *For. Abstr.* 13 (No. 3506).

3511. HESKE, F. Die Waldwirtschaft in der Türkei. **[Forestry in Turkey.]** *Z. Weltforstw.* 14 (6), 1951 (161–70). 21 refs. [G.e.f.]

Describes existing forest areas, gives figures for timber production, and discusses the possibility of balancing increment and drain, by providing other fuels, by better use of agricultural and wood wastes, by control of grazing and by restoring existing forests and afforesting waste lands. [Cf. *For. Abstr.* 13 (Nos. 2713, 2812, 3509).]

3512. INABA, S., KONDO, Y., SHIMADA, K., and OHTA, Y. **A symposium. The future development of Japanese forestry.** *For.* [*industr.*] *Econ., Tokyo* 3 (5; 6), 1950 (18–25; 11–5). [Jap.]

A discussion by four Japanese specialists in economics and forestry (two being professors of Tokyo University) on some fundamental problems in Japanese forestry. In chief: (1) the co-ordination of afforestation, land reclamation and hydro-electric schemes, in the light of an absolute shortage of fuel; (2) the efficient application of State subsidies to private forestry; (3) the proper conduct of State forestry, which plays a dominant role in Japan. [Cf. *For. Abstr.* 13 (Nos. 3514; 3535).]

904. *General Regional Accounts of Forests and Forestry*

See also Nos. 2974, 3250, 3511.

3513. BUCHHOLZ, E. Die Waldverbreitung in der Sowjetunion. **[Forest distribution in the Soviet Union.]** *Z. Weltforstw.* 14 (1/2), 1951 (6–14). [G.e.f.]

Contains information supplementing and explaining the forest map of Northern Eurasia published by the Bundesanstalt für Forst- und Holzwirtschaft. [Cf. *For. Abstr.* 13 (No. 1057).]

3514. CUMMINGS, L. J. **Forestry in Japan 1945–51.** *Rep. nat. Resour. Sect., G.H.Q., S.C.A.P., Tokyo* No. 153, 1951. pp. 143.

An account of the forest situation, extent and ownership of forest land, forest growth, standing volume, and types, administration of forest land, and programmes for survey, exploitation and utilization, management, afforestation, protection, and research, initiated during the occupation. [Cf. *For. Abstr.* 13 (No. 3512).]

3515. DATTA, S. K. **The forests of Tripura** *Indian For.* 78 (2), 1952 (68–80).

Described under the headings of Part I of a standard Indian working plan, with the most important remedial measures summarized.

3516. WECK, J. Die forstlichen Verhältnisse des neufundländischen Teiles von Labrador. **[Forest conditions in the Newfoundland territories of Labrador.]** *Z. Weltforstw.* 14 (1/2), 1951 (15–21). 5 refs. [G.e.f.]

Discusses the geology, climate, flora and fauna of southern Labrador and gives figures for increment and yield of the Spruce and Fir forests.

3517. HEINTZLEMANN, B. F. **Forestry in Alaska.** *Bulletin of the National Research Council, Washington* No. 122, 1951 (126–33). O.R.S.

A general account of the extent, composition, ownership and management of Alaskan forests, and of the timber industries of the region, notably the pulp and paper industry.

3518. TURNER, M. R., and VEILLON, V. P. Estudio de las zonas forestales del estado Portuguesa. **[Study of the forest regions of the state of Portuguesa.]** Departamento de Divulgación Agropecuaria, Ministerio de Agricultura y Cría, Caracas. 1949. pp. 65 + 1 map. [Span.]

The report, which is a translation from an English text, deals with: the causes of the regression of the forests in Portuguesa (Venezuela); the composition and constitution of some of the most characteristic forest formations; future silvicultural policy; present methods of exploitation; the timber industry; the organization of the forest service; forest fires; and special problems of the mountainous areas. It also presents suggestions for a reforestation programme.

3519. CURRAN, H. M., VEILLON, J. P., and BUDOWSKI, G. Observaciones y recomendaciones en materia forestal para el estado Trujillo. [**Observations and recommendations concerning forestry in the state of Trujillo [, Venezuela].**] Departamento de Divulgación Agropecuaria, Ministerio de Agricultura y Cría, Caracas. 1949. pp. 27 + 1 map. [Span.]

Discusses climate and forests, the causes, results and control of soil erosion, and the present organization of the forest service within the state, and presents some suggestions for its improvement.

905. *Forest Statistics and Resources*

See also No. 3511.

3520. TERSMEDEN, C. Några förelöpande resultat från riksskogstaxeringen av Göteborgs och Bohus län, Älvsborgs län samt Värmlands län. [**Some preliminary results of the State Forest Survey, in the counties of Göteborg and Bohus, Älvsborg and Värmland.**] *Svenska SkogsvFören. Tidskr.* 49 (4), 1951 (365–70). [Sw.] (*Medd. SkogsforsknInst., Ser. Uppsatser* No. 21.)

Tabulates the results, showing: forest land as a % of the total area; forest land by site quality and age classes; the volume u.b. by species and diameter class with comparative figures for 1928–9; and volume o.b./ha. by ownership category.

907. *Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)*

3521. OECHSLIN, M. Der Kampfzonenwald. [**Timberline forests.**] *Mitteilungen der Naturforschenden Gesellschaft Schaffhausen* 23, 1949/50 (273–9 + 6 photos). [G.] L.S.

Discusses the marginal forests of the timberline in Switzerland and the value of their rôle as protection forests.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 3509, 3511–2, 3514.

3522. WHYTE, R. O. [Editor]. **Management and conservation of vegetation in Africa. A symposium.** *Bull. Bur. Pastures Field Crops* No. 41, 1951. pp. 97 + 38 photos.

Contains the following contributions: Conservation of vegetation in South Africa (*J. D. Scott*); The vegetation in relation to soil and water conservation in East Africa (*D. C. Edwards*); Conservation of vegetation in Tanganyika Territory (*H. J. van Rensburg*); Agriculture and forestry in relation to soil and water conservation in Sierra Leone (*R. C. Deighton*); Some notes on the ecological status of savannah vegetation in Nigeria (*R. W. J. Keay*); Management and conservation in the Anglo-Egyptian Sudan; Forest reservation in the Gold Coast (*A. Foggie*).

3523. MALMSTRÖM, C. Om de svenska markens utnyttjande för bete, åker, äng och skog genom tiderna, och orsakerna till rörligheten i utnyttjandet. [**The use of land in Sweden for pasture, arable, hay, and forest at different periods, and causes of changes in land use.**] *K. LantbrAkad. Tidskr., Stockh.* 90 (5), 1951 (292–314). 40 refs. [Sw.e.] E.M.B.

Outlines the changes in land use, and the interaction of its different forms, in relation to the historical, social and technical background.

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

922. *Publicly Owned Forests*

3524. ČOLIĆ, D. Šumski rezervati u Srbiji. [**Forest reserves in Serbia.**] *Šumarstvo* 4 (1), 1951 (20–6). [Serb.]

Brief descriptions of the 13 forest reserves so far constituted in Serbia. The total area of these is ca. 2,600 ha.

3525. **Britain's forests: Strathyre.** H.M. Forestry Commission, London. 1951. pp. 17. Price 1*s.*

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

See also No. 3509.

3526. SCANDURA, A. Codice forestale. [**The forest code.**] Stamperia nazionale, Rome. 1951. pp. 313. Price *Lire* 1300 [19*s.* 6*d.*]

Gives the text of the forest law of 1923, which codified existing laws, and other laws on allied subjects, e.g. hydrology, management of mountain land and of publicly and communally owned forest.

3527. **The Forest (Amendment) (No. 3) Rules, 1949.** Government Printer, Dar es Salaam. 1949. pp. 7.

Gives amended schedules of: (1) names of native species, (2) forms of licence, (3) royalties, and (4) minimum felling girths of the more important species.

3528. Ley forestal y su reglamento. [**Forest law and its regulations.**] Ediciones Botas, Mexico. 1951. pp. 108. [Span.]

Text of the Mexican law of 1950.

3529. Groupements de propriétaires en vue du reboisement et de la conservation des forêts. [**Associations of landowners for purposes of afforestation and forest conservation.**] *Rapp. Fonds for. nat. Jan-Juin 1951*, 1951 (31–4 + 8-page typed draft). [F.]

Discusses a proposed law (draft appended) to permit the formation of private forestry societies and forest co-operatives in France.

3530. **Legal position of owners of roadside trees.** *Quart. J. For.* 46 (1), 1952 (46–8).

A legal opinion on the liability of owners for injury to persons or things caused by trees or branches blowing or falling down on a highway, or for obstruction to a highway.

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

941. *State Subsidies etc.*

See also No. 3512.

3531. Beregning av statsbidrag til skoggrøfting. **[Calculating state grants for forest drainage.]** *Tidsskr. Skogbr.* 59 (7/8), 1951 (277). [Nor.]

Gives two tables showing the amount that can be invested in Kr./dekare for different average stand heights and peatland types in districts with poor and good reaction to drainage, based on current stumpage values. [Cf. *For. Abstr.* 13 (No. 2362).]

943. *Forest Insurance*

See Nos. 3067–8.

944. *Co-operation. Collaboration of Forest Owners*

See Nos. 3262, 3529.

945.1. *Advisory and Information Services. Documentation Centres*

3532. **Report of the Joint FAO/Union Committee on Bibliography.** Joint Committee of the International Union of Forest Research Organizations (Union) and the Food and Agricultural Organization of the United Nations (F.A.O.). 1951. pp. 9.

945.3. *Education. Training*

3533. TORTORELLI, L. A. La enseñanza forestal superior en la Argentina. **[Higher education in forestry in Argentina.]** *Cienc. & Invest., B. Aires* 7 (6), 1951 (272–4). [Span.] A.P.B.

Comments on the forestry situation in Argentina and the necessity for training experts, and outlines briefly the forestry course recently inaugurated at the Facultad de Agronomía y Veterinaria, Buenos Aires University.

3534. HJORTH, R. Utbildning i skogsarbete: ny gren av skogsvårdsstyrelsernas undervisningsverksamhet. **[Training in forest work: a new branch of the [Swedish] forest administration's educational work.]** *Från skogsvårdsstyrelsernas arbetsfält* pp. 25–34. [Sw.] *Suppl.* to *Svenska SkogsvFören. Tidskr.* 49 (4), 1951.

945.4. *Research*

See also Nos. 2773, 3026, 3346, 3399, 3455.

3535. TRAYER, G. W. **Policy and program for forest research in Japan.** *Prelim. Stud. nat. Resour. Sect., G.H.Q., S.C.A.P., Tokyo* No. 64, 1951. pp. 18. 16 refs.

Discusses the forest situation and the history and present situation of research, and makes recommendations.

3536. TAYLOR, R. F. **Alaska forest research problems and program.** *Bulletin of the National Research Council, Washington* No. 122, 1951 (41–2). O.R.S.

Abstract of a paper outlining research programmes on: the effect of fires on succession; methods of cutting the all-aged climax forest for pulpwood, to ensure good second-growth stands; methods of predicting quality and quantity of second growth on the basis of the present uneven-aged climax stands; and the effect of pulpwood logging on salmon spawning streams.

3537. MARASSI, A. L'Oriente peruviano e la Stazione sperimentale agraria di Tingo Maria. **[Eastern Peru and the agricultural experiment station of Tingo Maria.]** *Riv. Agric. subtrop. trop. Firenze* 45 (4/6), 1951 (172–95). 8 refs. [It.it.e.] E.M.B.

Research on forestry is among the activities of the station, and a table gives sp. gr. and volume shrinkage at a given moisture content, of the wood of *Swietenia macrophylla*, *Chrysophyllum* sp., *Cedrela* sp., *Myroxylon balsamum*, *Ceiba pentandra*. *Genipa* sp., *Brosimum uleanum*, *Aniba* sp., *Juglans* sp., *Sickingia* sp., *Cedrelinga catenaeformis* and *Clarisia* sp.

946.2. *Conferences and Excursions*

See also Nos. 3400, 3430.

3538. Congrès national du châtaignier tenu à Brive les 6, 7, 8 Mai 1949. **[National Chestnut Conference held at Brive 6–8 May 1949.]** *Bull. tech. Châtaignier Éc. Eaux For. Nancy* 1950. pp. 85 + 12 photos. [F.]

Contains a number of papers on various subjects including *Endothia parasitica* (*H. Darpoux*), breeding (*C. Schad*), use of Chestnut wood for cooperage (*M. Marquès*), and vegetative propagation (*M. Marcel*). [Cf. *For. Abstr.* 13 (No. 2868).]

3539. HJORTH, R. Norrlands Skogsvårdsförbunds exkursion till Norrbotten, 3–5 Juli 1950. **[The Norrlands Skogsvårdsförbund's excursion to Norrbotten, 3–5 July, 1950]** *Norrlands SkogsvFörb. Tidskr.* 1950 (4), (397–555). [Sw.]

Includes papers by T. Arnborg and E. W. Höjer, and discussion on: cleaning in Pine and Spruce; sowing and planting methods; the use of 'hormone' preparations in killing Birch and other hardwoods; and methods and equipment (with illustrations) used in soil cultivation.

3540. Hē syskepsis tōn dasologōn ton Oktōbrion 1949 eis Athēnas. **[[Proceedings of] the Conference of [Greek] foresters, October 1949, Athens.]** *Dasos* No. 11/12, 1949 (3–240). [Gk.]

The whole number is taken up by the proceedings, with preface, speeches, excursions, papers submitted. Subjects include: reforestation, torrent control, sleeper production, forest protection, upland pasture management, supervision of private forests, forestry propaganda, wildlife management.

95. FOREST TAXATION

See also No. 3256.

3541. HANDA, R. **Forest taxation.** *Trans. 59th Mtg. Jap. For. Soc.* 1951 (30–2). [Jap.e.]

Discusses the effect of tax reform in 1950 on local forest taxation. Findings are based on data from the village of Tomihara in Okayama prefecture.

3542. BESLEY, L. **Taxation of crown-granted timberlands in British Columbia.** *For. Bull. Fac. For. Univ. B.C.* No. 1, 1951. pp. [v] + 86. 40 refs.

3543. MAHOOD, I. **Property taxation to encourage tree farming in British Columbia.** *For. Chron.* 27 (4), 1951 (306–12).

3544. BARRACLOUGH, S., and GOULD, E. M., JR. **A preliminary appraisal of New Hampshire's forest-yield tax.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 45, 1951. pp. 26. 3 refs.

Discusses the old tax system and the new one (based on a yield tax of 10% of the stumpage value on timber at time of felling) and the effects after the first 6 months of the new system.

96. FOREST LABOUR QUESTIONS, LABOUR QUESTIONS IN WOOD TRANSPORT AND THE WOOD INDUSTRIES

See also Nos. 3027, 3031, 3248.

3545. KATSUKI, S. **Observations on forestry labour from a scientific aspect.** *For.* [*industr.*] *Econ., Tokyo* 3 (5), 1950 (1–7). [Jap.]

A preliminary study comparing the working conditions and welfare of sample groups of forest workers with other classes of labour, e.g., peasants, and factory or clerical workers. It is concluded that existing conditions prevent forest labour from maintaining a proper standard of performance. It lacks—as is shown in a number of graphs—the necessary nourishment and regular rest. The solution lies, it is suggested, in rationalization of labour processes and the raising of productivity by this and by mechanization.

3546. LAAKSONEN, Y. W. `Metsä- ja uittotyöt työllisyyskysymyksenä. **[Floating and forest work in relation to employment [in Finland].]** *Metsät. Aikak.* 1951 (11), (291–2, 294). [Fi.e.]

The seasonal nature of forest work has prevented the building up of a permanent labour force. Figures are quoted showing the considerable fluctuations in forest employment and their relation to changes in the trade cycle. As the rural population is largely dependent on forest employment in winter, and as other employment is adequate during the growing season, the continued concentration of forest work into autumn and winter is desirable. If it were possible to estimate in early autumn the employment available during the coming winter, the responsible authorities could more easily arrange for relief work where necessary. [Cf. *For. Abstr.* 12 (Nos. 857–60, 3539).] *From author's summary.*

3547. CANTILLON, J. H. **The application of piece work to forest operations.** *Irish For.* 8 (2), 1951 (58–9).

Gives a table of piece-work rates based on a time wage of £4 a week for various nursery, planting, draining, weeding, thinning and fencing operations.

3548. WALLNER, O. Den nya skogsförläggningslagen. **[The new [Swedish] law governing forest accommodation.]** *Svenska SkogsvFören. Tidskr.* 49 (4), 1951 (348–56). [Sw.]

Summarizes the provisions of the law dated 1 Jan. '52 relating to huts for forest workers and stable accommodation for their horses.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses, Conferences; Excursions*

3549. **Report of the 5th session of the International Poplar Commission and Proceedings of the 4th International Poplar Congress.** FAO, Rome. 1952. pp. 68.

3550. HERBIGNAT, A. Quatrième Congrès International du Peuplier: Cinquième session annuelle de la Commission Internationale du Peuplier. **[Fourth International Poplar Congress: Fifth annual session of the International Poplar Commission.]** *Bull. Soc. for. Belg.* 58 (12), 1951 (497–546 + 6 photos). [F.]

Includes short abstracts of some of the papers presented to the Congress.

FORESTRY THE WORLD OVER

References: 1. *British Columbia Lumberman*, Vancouver; 2. *Builder*, London; 3. *Burmese Forester*, Rangoon; 4. *Foreign Commerce Weekly*, Washington; 5. *Forêts de France*, Paris; 6. *Indian Forester*, Dehra Dun; 7. *Journal of Forestry*, Washington; 8. *Lumberman*, Seattle; 9. *Monti e Boschi*, Milan; 10. *Nature*, London; 11. *New Zealand Journal of Forestry*, Palmerston North; 12. *Paper Trade Journal*, New York; 13. *Plants and Gardens*, Brooklyn, N.Y.; 14. *Pakistan Journal of Forestry*, Abbotabad; 15. *Report of the Forest Department, Gold Coast*, Accra; 16. *Svensk Trävarutidning*, Stockholm; 17. *Timber Trades Journal*, London; 18. *Timberman*, Portland, Ore.; 19. *Wood* London; 20. *Wood Notes*, New Haven.

Conferences. The following conferences have been arranged:

1952

Aug. 10–Sept. 13.	6th Commonwealth Forestry Conference, Ottawa.
Aug. 17–23.	6th International Grassland Conference, Pennsylvania.
Sept. 3–9.	International Union for the Protection of Nature, 3rd General Assembly, Caracas, Venezuela.
November. (8 days)	Joint Meeting of European Forestry Commission and ECE Timber, Geneva.
Dec. 1–13.	Far East Forestry Commission, Singapore and Kuala Lumpur.

Burma. Up to 4 Jan. 1948 there existed two Forest Service Associations, one for members of the Class I Service and the other for members of the Class II Service. With the transfer of power, the two services were amalgamated and formed into one body, the Burma Forest Service. The two associations were also merged into one, the Burma Forest Service Association (3; Sept. 1951).

Canada. The Ontario Paper Co. Ltd., of Thorold, Ont., has announced a new process for manufacturing vanillin from paper-mill waste liquor. The company has already begun to build a $1,300,000 manufacturing plant at Thorold, designed to produce 400,000 tons of vanillin annually. The new process is said to make possible a better-quality lignin (1; Feb. 1952).

France. A new rabbit-repellent oil, 'Cunifuge', has a very powerful and lasting smell. All that is necessary to keep rabbits off an area, is to surround it with a rope soaked in the oil. 'Cunifuge' can be obtained from Manufrance, Saint-Etienne, Loire, at a cost of Fr.1560 for a 5-kg. can (enough to impregnate ca. 300 m. of rope). A thick, absorbent, jute rope suitable for impregnation can be obtained from the same firm at a cost of Fr.560 per 65 m. (5; April 1952).

Gold Coast. Crocodiles became a nuisance in one nursery, and two of them fell into one of the nursery wells. Since they are fetish in that part of the country, they had to be rescued. Elephants caused slight damage in three nurseries. It is reported, however, that in two of the nurseries they considerately kept to the paths (15; 1951).

The Government of the Gold Coast has given a contract to Messrs. Pest Control Ltd. for the supply of £50,000 worth of 'Hanane' for a large-scale attempt to control the swollen-shoot disease of Cacao. Hanane, which is a mixture of two well-known phosphorus insecticides (*bis* (dimethylamino) fluorophosphine oxide and *bis* (*bis*-dimethylamino) phosphonous anhydride) is a systemic poison lethal to the insect vector of the disease [cf. *For. Abstr.* 13 (Nos. 1345–6)]. The proposed plan is to apply Hanane to the roots of all the Cacao trees surrounding a focus of infection, which would be destroyed by cutting out. It is hoped that in this way the spread of the infection may be arrested and trees saved that would otherwise have had to be sacrificed (10; 29.3.52).

Great Britain. 'Hiab' hoists, manufactured in Sweden, are to be imported by J. R. Gordon & Co. of 14 Newgate Street, Chester. The hoist is designed for attachment to the chassis of a vehicle immediately behind the driver's cab, where it is permanently fixed. It can load small timber of up to 15–18 cu. ft. with the jib fully extended. The driver and his mate can load the vehicle in place of the 6 men usually required, and the equipment should prove particularly valuable for handling thinnings. The design of the hoist is such that it can be operated in confined spaces such as forest rides. It is hydraulically powered and may be controlled by the driver from either side, standing on the lorry or

on the ground, and in fact, one man could do the whole of the loading, though it is of course far quicker with two men (**17**; 8.3.52).

A meeting was held in Liverpool in February 1952, to consider the formation of an Institute of Machine Woodworking Technology. The objects and qualifications for membership were discussed, and a council of persons already holding qualifications in excess of those required for membership was elected. It was suggested that an annual examination should be held in advanced subjects and that the Institute should publish a journal giving particulars of new technical developments (**19**; March 1952).

India. Advantage was taken of the presence of a large number of forest officers at the 8th Silvicultural Conference, to discuss the formation of an association of professional foresters for India. After a full discussion, a committee consisting of all the gazetted forest officers of the Forest Research Institute and those stationed at Dehra Dun was formed to draft the by-laws of the proposed association (**6**; Feb. 1952).

Italy. The first full academic year of the *Accademia italiana di Scienze forestali* was inaugurated on 1 Jan. 1952 at the Palazzo Vecchio in the presence of the President of the Republic. The aims of the academy are to encourage and co-ordinate research and to encourage both national and international co-operation in forestry and the related sciences. The State Forest Service has provided the academy with spacious accommodation in the Villa Favorita at Florence (**9**; Feb. 1952).

Netherlands. The Afrika Institute of Rotterdam, in co-operation with the University of Amsterdam, is installing a laboratory for research on the manufacture of pulp from woods native to French Equatorial Africa and the Belgian Congo (**4**; 17.3.52).

One way of utilizing the by-products of sawmills in Holland has been found in the manufacture of wood bricks from sawdust, shavings etc. They have been proved eminently suitable for many types of building work, especially for interior work and for non-load-bearing walls. Their sound-insulating properties make these bricks excellent for dividing walls in houses and office-buildings, and their high heat-insulating properties are an asset in the construction of cold-storage warehouses and refrigerators. Indeed, the 'Atmota' brick, as it is known, has already been used in the construction of cold-storage warehouses, laboratories, hospitals, schools, meeting-halls, waiting-rooms, concert-halls, in the insulating wall of frost-proof repositories and in various other capacities where sound and heat insulation are of importance. Compared with ordinary bricks, the 'Atmota' has many favourable qualities. It is very light in weight, having a specific gravity of only 0·57, which results in easy handling and a saving in transport expenses; furthermore, foundations might well be less heavy than if ordinary brick were used. The wood brick is so made that it takes cement mortar readily and is pleasant to handle. It can be chopped into halves or quarters and yet does not break easily during transport or in loading or unloading, an economy of 6–10% being effected in this way over normal bricks. Another favourable property is its ability to take nails or screws without any previous treatment and without the use of rawl-plugs or similar devices. The brick is non-inflammable and when tested to red-hot heat no ignition was observed. Usual sizes of manufacture are 24 × 12 × 5 cm., 24 × 12 × 6 cm., 24 × 12 × 7 cm., and 24 × 12 × 9 cm. (**2**; 16.11.51).

New Zealand. The Government has decided that the stabilization and development of coastal sand areas should become the joint responsibility of the Department of Lands and Survey and the N.Z. Forest Service. The primary object of this work is the reclamation of land for agricultural and pastoral use. Up to the present some 10,000 acres of forest have been established and much land protected from further sand encroachment, and the tending of this forest is now becoming a major activity (**11**; 1951).

Northern Rhodesia. A plant established in Northern Rhodesia for the manufacture of hardboard from wood waste is now producing Zambaboard in thicknesses ranging from ¼ to ¾ in.; board 1½-in. thick has been manufactured experimentally. A variety of finishes can be applied, and a normal plywood veneer can be successfully glued to it. Tests at the Building Research Station in Hertfordshire show that it complies with or exceeds the strength requirements of British Standard Specification No. 1142 (**17**; 10.5.52).

Norway. It is proposed to float large Birch timber and Birch pulpwood from the Lierne district of Norway through Sweden via Lakes Rengen and Hotagen and by Harkaå and Indalsälv to the coast

at Sundsvall. Previously Birch pulpwood exported to Sweden from this part of Norway has been taken by road. The wood will be given different forms of treatment, including impregnation of the ends of the logs to reduce water absorption, and a study will be made of sinking losses for different kinds of wood and for the different treatments (**16**; 15.4.52).

Siam. The Ministry of Agriculture has let it be known that Teak-cutting concessions in northern Siam owned by foreign firms will not be renewed when they expire in 2–5 years' time. It is expected that the Government will retain a monopoly of operations. It is now possible to ship timber abroad only with the specific permission of the Prime Minister (**4**; 7.1.52).

Turkey. The Faculty of Forestry at the University of Istanbul has created an Institute of Forest Geography and Forest Problems of the Near East to work in close co-operation with the existing research and teaching activities of the Faculty. Professor Franz Heske is Director of the Institute (**14**; Jan. 1952).

U.S.A. The Du Pont Company has established the fact that accidents can be caused by electric blasting caps being set off by radio transmitters, and Wisconsin Conservation Department has accordingly warned all its field men to keep the caps at least 100 ft. away from 10–100 watt transmitters, 300 ft. away from a 100–500 watt transmitter and a quarter of a mile away from a transmitter of 500 watts or more (**7**; Feb. 1952).

The Connecticut Park and Forest Commission, in co-operation with the Northeastern Forest Experiment Station, has experimented with the 'stepping' method for treating tobacco-shade poles, and posts and poles for other purposes, using zinc chloride. In dense stands (e.g. Pine plantations) the trees were cut and 'hung up' in an adjacent tree or trees at an angle of about 65°. The butts were then slid from the stump into containers holding the preservative. For trees up to 5 in. d.b.h., 5-gal. paint tins proved satisfactory; for larger trees, grease drums or 55-gal. drums cut in half were excellent. Aqueous solutions, 5–10% strength, were used, allowing 1 lb. of the zinc salt/cu. ft. of wood. Take-up of the solution was completed in 24–48 hr. during the summer months and the containers could then be used again. Several more days were required for the preservative to be distributed throughout the tree, after which the tree was dropped to the ground, limbed and cross-cut to desired length. Plantation-grown Red Pine was the main material tested, but sufficient samples of Red Maple and Gray Birch were treated, to indicate that hardwoods can be treated in the same manner (**20**; March 1952).

After 3 years' experimental work H. C. Taylor of Rosedale Nurseries, Eastview, New York, has produced a plastic latex liquid spray ('Wiltpruf') which prevents wilting in plants being transplanted in midsummer. An outstanding example of the success of the spray has been the transplanting of a 40-ft. Pin Oak [*Quercus palustris*] in full foliage (**13**; Dec. 1951).

A 3-in. ribbon of steel was torn from a 14-in. bandsaw at an Oregon mill by a meteorite embedded in a log. The meteorite was so hard that it would cut glass. This is the first known reported instance in sawmilling history of a saw hitting an embedded meteorite (**18**; March 1952).

Tests at Yale on Kaneelhart (*Licaria cayennensis*) have showed it to be one of the strongest and heaviest of known woods. It has very high wear resistance and takes a high polish. Taking White Oak as a standard (100), Kaneelhart was found to have a crushing strength of 467, a bending strength of 311, and a density of 168. The species (with many varieties) is found in Central America and along the northern coast of South America (**7**; April 1952).

An aerial tramway has been installed in Idaho to carry loads of logs across the Salmon river; the river level fluctuates considerably with the season, and a structure over 400 ft. long would be needed to bridge it. Logs are brought to one bank in a lorry trailer, the entire load is lifted by the tramway, carried across the river, and lowered on to an empty trailer, with little or no change in load arrangement. The loads average 5000 bd. ft. and 20 to 30 loads are transported every day. The tramway has a span of 850 ft. between 2 sets of 40-ft. upright spars supporting four 1½-in. wire-rope skylines in pairs with 15 ft. between the pairs. The carriage unit, a rectangular structure, each end of which is supported by a pair of skylines, carries the load suspended by wire-rope slings. A 3-drum converted Willamette donkey, equipped with a 145-h.p. industrial Ford V-8 engine provides the power (**8**; Feb. 1952).

The first agreement in the Pacific Northwest for industrial use of Douglas Fir thinnings has been announced. The St. Paul and Tacoma Lumber Company, Tacoma, Wash., will supply about 3000 poles a month to the Tacoma Smelter which uses them as a flux in molten mixes of lead and copper. About 1600 acres of St. Paul and Tacoma forests will be thinned annually for stand improvement and the poles will go to the smelter. The 25-ft. smelter poles are cut from stands 30–50 years old (**18**; April 1952).

An experimental sawdust-fed gas turbine has been in operation at the Oregon Forest Products Laboratory, Corvallis, Ore., since November, 1950. It is an aircraft turbosupercharger set up as an open-cycle gas turbine, using a waste-wood-fired combustion system consisting of an underfeed stoker supplied with undergrate air, overfire jets, and dilution air admitted above the furnace. Combustion efficiencies of 92·5–99% have been obtained. Heat release rates up to 900,000 B.T.U. per sq. ft.-hour, based on the grate area (3 times as much as attained in most sawmill installations), and 200,000 B.T.U. per cu. ft.-hour based on furnace volume (ca. 15 times as much as usually attained in most boiler installations using wood fuel) have been realized. The fuel used in all tests was Douglas-Fir sawdust as received from the sawmill, with an average moisture content of ca. 40% (**12**; 4.4.52).

A programme to build wooden 'lungs' for the treatment of poliomyelitis instead of the much more expensive 'iron lungs' has been launched by the U.S. Junior Chamber of Commerce working with the editors of *Popular Mechanics Magazine* and civic leaders in Chicago and elsewhere. The wooden substitute was first described in the Journal of the American Medical Association. Cost of materials is estimated at about $200 as against about $2000 for an ordinary iron lung. *Popular Mechanics Magazine* gives specifications, drawings and construction details in its issue for January 1952. Highland Park Hospital, Highland Park, Illinois, has received the first wooden lung made. It was built in the vocational building-trade classes at the local school (**1**; March 1952).

A process for using sulphite liquor to change sand or clay into a substitute for road gravel has been developed at Cornell University. Ingredients of the road material are: whatever soil is chosen, sulphite liquor and a sodium compound. The mixture is fused in a briquetting machine and then crushed to a size suitable for road surfacing. The material is not cheap, but is said to be sufficiently economical to be used for road-building where no gravel is available. Tests are reported in which the material remained under water for 6 months without disintegrating, and stood up under freezing and thawing. The Cornell engineers estimate that one truckload of additives will make 30 truckloads of the product (**1**; Feb. 1952).

CORRIGENDA.

1. In *For. Abstr.* Vol. 13 (No. 817), line 10 (overleaf), read ". . . from 46 to 70% . . ."

2. In *For. Abstr.* Vol. 13 (No. 2314), lines 11 and 12, read ". . . 8½ times as much K, 1½ times as much P, and the same amount of Ca as . . ."